Assigned on Friday, August 23, 2024

Lab: Walk This Way

Due Tuesday, August 27, 2024

Objective

Identify relationships between various 1D motions and their representations in position vs. time (x vs t) and velocity vs. time (v vs t) graphs.

Part 1: Exploration

1. Make sure that the LabQuest MINI is NOT plugged into your Chromebook. Go to the Apps menu of your Chromebook and select the Vernier Graphical Analysis App. Click on “Sensor Data Collection”.
2. Plug the LabQuest Mini into the USB port of your Chromebook. You should see “LabQuest MINI” under connected devices. If so, click on the DONE button. Your Motion Detector should be making a clicking sound now.
3. Click on the Mode button at the bottom left of the screen. In the “Rate” box, change the setting to 5. In the “End Collection” box, change the seeing to Manually.
4. Place the motion sensor on the edge of your desk facing forward. One partner should stand in front of the motion sensor holding a dry erase board and then another partner should click the COLLECT button.
5. The person in front of the motion sensor should now make various movements in 1 dimension (towards and away from the sensor) making sure that the dry erase board is held straight up and down throughout the movement.
6. To stop data collection, press the STOP button. To optimally rescale data, click on your data on the graph. To select a certain portion of your graph, click and drag on your graph to highlight the section you want and then click on the magnifying glass at the bottom left. To zoom out again, click on the magnifying glass again.
7. Look at the position vs. time graph and the velocity vs. time graph. What do you notice about their properties as you do various motions? Write down your observations in Data Table 1. (Example: Moving slowly away from the sensor at a constant speed.)

Part 2: Predicted Graphs from a Description of Motion

1. In data table 2a, you are given descriptions of various motions. Make qualitative predictions about what the x vs t and v vs t graphs will look like for each description. You will not be penalized for incorrect predictions. Draw your predictions on the given coordinates.
2. AFTER you have made your prediction, perform the motion described and draw the experimental graphs in Table 2b. How well did your predicted graphs match the experimental graphs?

Part 3

1. In data table 3, you have been given x vs t and v vs t graphs. Use your motion sensor to recreate the graph on the screen. Once you have done so, describe the motion that is shown in the graph.
2. Draw a qualitative graph on the missing graph coordinates that matches the given graph’s motion. Notice that two of the missing graphs are acceleration vs. time. Think carefully about these introductory graphs to acceleration.

Names: _____ Period: _____ Assigned on Friday, August 23, 2024

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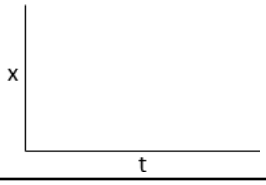
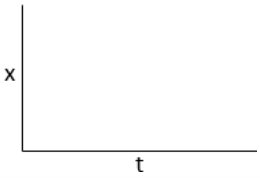
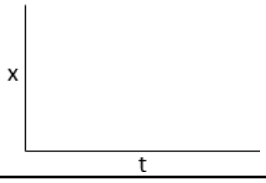
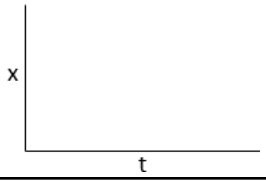
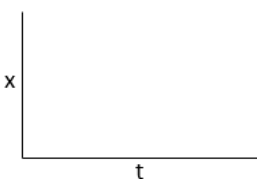
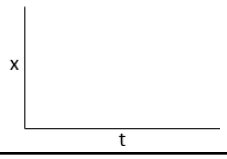
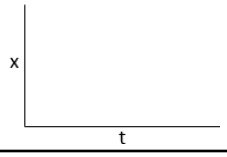
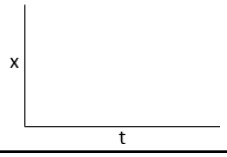
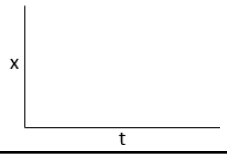
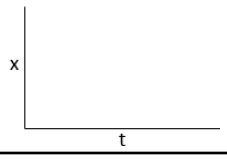
Data Table 1

Data Table 2a

Stand close to the motion sensor and then slowly walk away from it. Stop at about 1 m away from the sensor for about 5 seconds and then slowly walk away from the sensor for another meter.		
Stand about 3 m away from the motion sensor. Walk slowly towards the sensor and then suddenly walk faster towards it.		
Stand close to the motion sensor. Walk fast away from the sensor for about 1 m, then stop, and then walk slowly towards the sensor.		
Stand close to the motion sensor. Walk fast away from it and slow down as you get farther away.		
Stand about 3 m from the motion sensor. Start walking slowly towards the sensor at first, and then slowly speed up faster and faster as you get closer to it. Stop in front of it for about 3 s and then walk away slowly at constant speed.		

Data Table 2b

Stand close to the motion sensor and then slowly walk away from it. Stop at about 1 m away from the sensor for about 5 seconds and then slowly walk away from the sensor for another meter.		
Stand about 3 m away from the motion sensor. Walk slowly towards the sensor and then suddenly walk faster towards it.		
Stand close to the motion sensor. Walk fast away from the sensor for about 1 m, then stop, and then walk slowly towards the sensor.		
Stand close to the motion sensor. Walk fast away from it and slow down as you get farther away.		
Stand ~3 m from the motion sensor. Walk slowly towards the sensor at first, then slowly speed up faster and faster as you get closer. Stop in front of it for ~3 s and then walk away at constant speed.		

Data Table 3