Hiker Lab

In this lab, you will be given a graph and you must try to walk in a manner so that the graph of your distance vs. time looks like the given graph.

You will need:

1. A TI83 graphics calculator with the program MOVE.
2. A CBL unit
3. A motion sensor
4. A link cable
5. Some masking tape

Procedure:

1. Connect the motion sensor to the sonic port (on the left side) in the CBL.
2. Connect the TI-83 to the CBL using the link cable.
3. Set the motion sensor on a desk so that the area with the metal mesh over it points in the direction you will be walking. You might need to put a piece of masking tape over the sensor to hold it in position on the desk.
4. Turn on the TI-83 and hit the PRGM key. Run the program MOVE.
5. Turn on the CBL and follow the instructions on the calculator's screen and this lab.

NOTE: The CBL cannot get accurate data closer than about 0.5 meters, so your graphs will be distorted anywhere the y-values are less than 0.5 meters.

1. For this experiment, walk away from the motion sensor. (It will make a ticking sound and has a little red light while it is gathering data.) After you have a graph you like, study it carefully.
   a. Describe your walk in words. (Did you walk at a constant pace or slow down and speed up, walked continuously or stop and go, walked slowly or quickly, etc.?)

   b. In the space at right, record what your "hike" looked like.
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2. Consider the graph at right.
   a. If you were to try to walk and make a graph like this, describe what the pace of the walk would be (fast, medium, slow, constant, speed up and slow down, etc.).

   Hopefully, the word "constant" came up in your answer. That's the defining characteristic of a line! The graph of the line above shows a constant __________. Of all possible graphs, a line is the only graph that has this property!

   b. The slope of the line would be \( m = \frac{\text{Distance Walked}}{\text{Unit of Time}} \). What is the slope of this line?

   c. What other information does the slope give you about your motion?

   d. About how far from the motion sensor should you be at the end of 3 seconds? How did you figure this out?

   e. About how far from the motion sensor should you be at the end of 6 seconds? How did you figure this out?

   f. Try to walk the above graph. Draw your graph in the window at right. Your graph may not match exactly. If it isn't very close, try again.

   (1). What is the slope of your line?

   \[
   \frac{\text{(Constant) increase}}{\text{Unit of time}} =
   \]

   (2). What does the slope tell you about how to walk to match the graph?
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3. Consider the graph at right.
   a. How far from the motion sensor do you need to be at 3 seconds? at 6 seconds?
   b. What is the slope of this line? What does the slope tell you about how to walk to match the graph?
   c. Describe how you should walk to match this graph.
   d. Try to walk and match the graph. Draw the graph of your walk in the window at right. You may have to try more than once.

4. Consider the graph at left.
   a. How far from the motion sensor do you need to be at 1, 3, and 6 seconds?
   b. What is the slope of this line? What does the slope tell you about how to walk to match the graph?
   c. Describe how you should walk to match this graph.
   d. Try to walk and match the graph. Draw the graph of your walk in the window at right. You may have to try more than once.
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5. Consider the graph at right.
   a. How far from the motion sensor do you need to be at 1, 3, and 6 seconds?
   
   b. Does this graph show a constant increase per unit of time? What does that say about the linearity of the graph? Is the graph linear anywhere?
   
   c. Describe how you should walk to match this graph.
   
   d. Try to walk and match the graph. Draw the graph of your walk in the window at right. You may have to try more than once.

6. Consider the graph at left.
   a. How far from the motion sensor do you need to be at 1, 3, and 6 seconds?
   
   b. Describe how you should walk to match this graph.
   
   c. Try to walk and match the graph. Draw the graph of your walk in the window at right. You may have to try more than once.
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7. Consider the graph at right.
   a. How far from the motion sensor do you need to be at 1, 3, and 6 seconds?
   b. Describe how you should walk to match this graph.
   c. Try to walk and match the graph. Draw the graph of your walk in the window at right. You may have to try more than once.

8. Consider the graph at left.
   a. How far from the motion sensor do you need to be at 1, 3, and 6 seconds?
   b. Describe how you should walk to match this graph.
   c. Try to walk and match the graph. Draw the graph of your walk in the window at right. You may have to try more than once.

9. Consider the graph at left.
   a. How far from the motion sensor do you need to be at 1, 3, and 6 seconds?
   b. Describe how you should walk to match this graph.
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c. Try to walk and match the graph. Draw the graph of your walk in the window at right. You may have to try more than once.

10. Suppose your parents came to this lab. They do not have any idea how to walk to match a graph. Explain to them how you can look at any graph and determine how you should walk to match the graph.

11. Suppose your parents were given the graph below at left to match.

However, when they walked, their graph looked like the graph at right.

Explain to them what they did wrong and what they should do to correct it.
12. As an extension of this lab, see if you can model the following graphs. Describe how you managed to duplicate the graph.

**DESCRIPTION OF WALK**

a. 

![Graph Image](image1.png)

b. 

![Graph Image](image2.png)

c. 

![Graph Image](image3.png)

d. 

![Graph Image](image4.png)

e. 

![Graph Image](image5.png)

f. 

![Graph Image](image6.png)