e-Motion!

Have you ever wondered how automatic doors at grocery stores know when to open? There is a sensor over the door that works similarly to Go!Motion. Go!Motion sends out sound waves that reflect from objects, such as your body. Based on the amount of time it takes the wave to bounce back, Go!Motion is able to calculate the position of the object.

OBJECTIVES

In this activity, you will

- Explore the different lines and curves produced by moving in front of the Go!Motion.
- Learn to write detailed steps for creating an M or W shape on the graph.
- Match different letter and designs drawn on the graph.

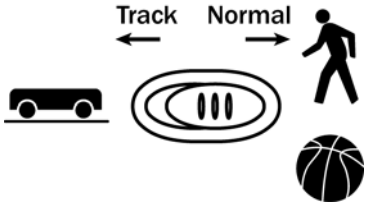
MATERIALS

computer with Logger Lite software installed
Go!Motion motion detector

PROCEDURE

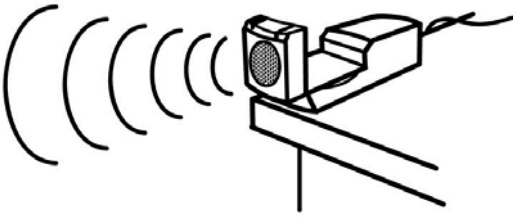
Part I Creating Straight-Line Graphs Such as M, N, and W

1. Do the following to set up the Go!Motion for data collection:
   a. Make sure the Go!Motion is connected to the computer.
   b. Set the switch on the Go!Motion to the Normal setting as shown here. You can find the switch by pivoting the head of the Go!Motion.



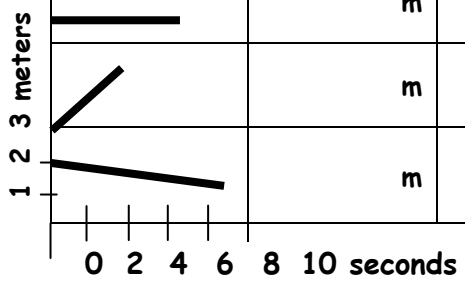
2. Start Logger Lite on your computer.
3. Open the file for this activity by doing the following:
   a. Click the Open button, .
   b. Open the folder called "Elementary Science."
   c. Open the file called "21 e Motion."

4. Set the Go!Motion on a table so that there is an open path at least 2 meters wide and 3 meters long in front of it. You should face the sensor and must also be able to see the computer screen or have it projected for the entire class.

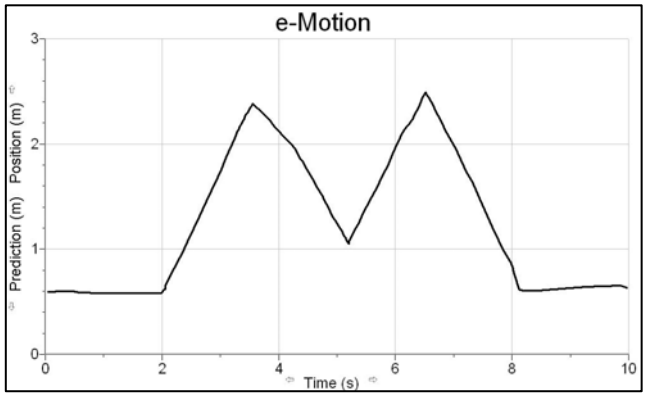


5. Before you begin, review the different segments you can create using the Go!Motion by completing the table below. (The height of each segment cell represents 3 meters and the time is 10 seconds for each cell.)

Segment	Starting position	Direction (forwards or backwards)	Time	Speed (fast or slow)
	m		s	
	m		s	
	m		s	
	m		s	
	m		s	

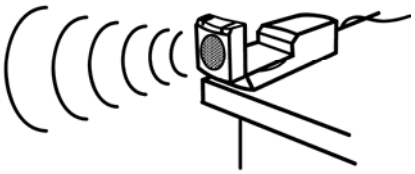


6. Use the Predict button, , on the tool bar to draw a large letter **M** shape on the graph. An example is shown below.



7. In this part of the activity, you will complete the steps necessary to create the letter **M** on the graph. You will have a total of 10 seconds.
   a. Start _____ meters from the Go!Motion.
   b. Stand still for _____ second(s).
   c. Move _____ (forward or backward) for _____ seconds moving _____ (fast or slow).
   d. Move _____ (forward or backward) for _____ seconds moving _____ (fast or slow).
   e. Move _____ (forward or backward) for _____ seconds moving _____ (fast or slow).
   f. Move _____ (forward or backward) for _____ seconds moving _____ (fast or slow).
   g. Stand still for the last _____ second(s).

8. Estimate the distance from the sensor needed to begin the **M** and then stand in front of the Go!Motion, facing it, at that position.



9. Have one person click ▸ Collect, and when you hear fast clicking, follow the directions in Step 7.

10. If the graph of the **M** looks like your prediction, congratulations! If you want to try to make the **M** again, just click ▸ Collect, and follow the directions you filled out in Step 7.

11. You will now make the letter **N**. To get started, do the following things:
    a. Choose Clear All Data from the Data menu on the computer screen.
    b. Click the Predict button, .
    c. Draw a big letter **N** on the screen.

12. On the lines below, write down the steps you would take to match the letter **N** that you drew on the computer screen. Use the words in Step 7 as a pattern.

    Steps for matching the letter **N**:

13. Have one student stand in the right place in front of the Go!Motion, then have another student click ▸ Collect. When you hear fast clicking, follow the directions you wrote in Step 12 for making the letter **N**.

14. If the graph of the **N** looks like your prediction, congratulations! If you want to try to make the **N** again, just click ▸ Collect, and follow the directions you wrote in Step 12.

15. You will now make the letter **W**. To get started, do the following things:

    a. Choose Clear All Data from the Data menu.

    b. Click the Predict button, .

    c. Draw a big letter **W** on the screen.

16. On the lines below, write down the steps you would take to match the letter **W** that you drew on the computer screen. Use the words in Steps 7 and 12 as a pattern.

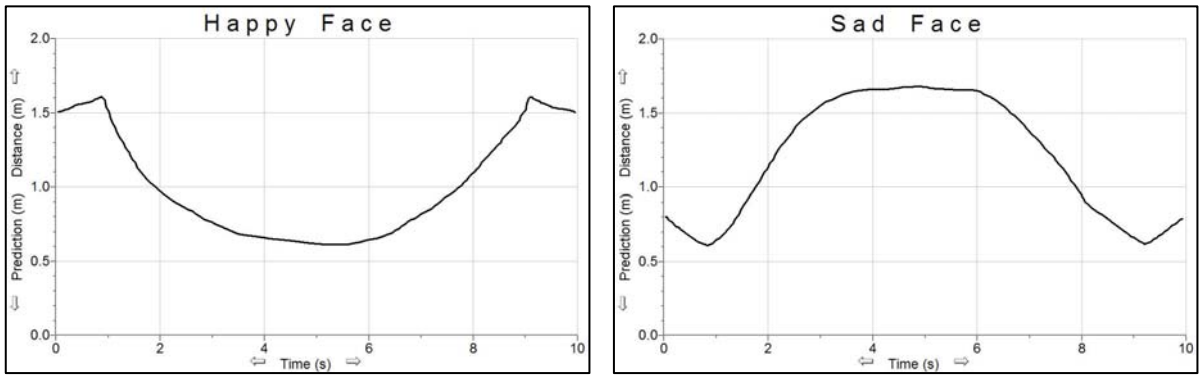
    Steps for matching the letter **W**:

17. Have one person stand in the right place in front of the Go!Motion, then have another student click Collect. When you hear fast clicking, follow the directions you wrote in Step 16 for making the letter **W**.

18. If the graph of the **W** looks like your prediction, congratulations! If you want to try the **W** again, just click Collect, and follow the directions you wrote in Step 16.

Part II e-Motion-al Graphs

You have now made three letters with straight-line segments. Now let's try expressing our e-motions by making a happy face and a sad face on the graph!



19. You will now make a happy face. To get started, do the following things:
    a. Choose Clear All Data from the Data menu.
    b. Click the Predict button, .
    c. Using the example above, draw a happy face on the graph. You will make the sad face later on.

20. Write the steps you should follow to match the happy face graph that you drew. Use the directions you wrote above as a guide for what to write.

21. Have one person stand in the right place in front of the Go!Motion, then have another student click Collect. When you hear fast clicking, follow the directions you wrote in Step 20 for making the happy face.

22. If the graph of the happy face matches the line that you drew, congratulations! If you want to try to make the happy face again, just click Collect, and follow the directions you wrote in Step 20.

23. You will now make a sad face. To get started, do the following things:

    a. Choose Clear All Data from the Data menu.

    b. Click the Predict button, .

    c. Using the example above, draw a sad face on the graph.

24. Write what you need to do to match the sad face:

25. Have one person stand in the right place in front of the Go!Motion, then have another student click Collect. When the you hear fast clicking, follow the directions you wrote in Step 24 for making the sad face.

26. If the graph of the sad face matches the sad face that you drew, congratulations! If you want to try to make the sad face again, just click Collect, and follow the directions you wrote in Step 24.

Good job!