

Learning to Use a Motion Detector

You can use a Motion Detector to measure the position of objects as they move. In this activity, you will learn how to use a Motion Detector.

OBJECTIVES

In this activity, you will

- Learn to use a Motion Detector.
- Measure the distance between a book and the Motion Detector.
- Match a shape by moving a book up and down above a motion detector.

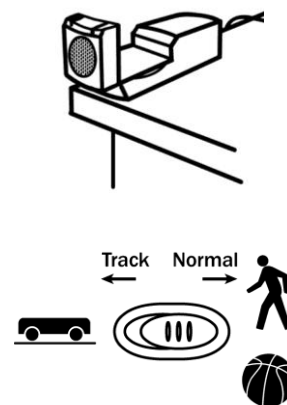
MATERIALS

LabQuest
Vernier Motion Detector
book

PROCEDURE

Part I Learn About Motion Detectors

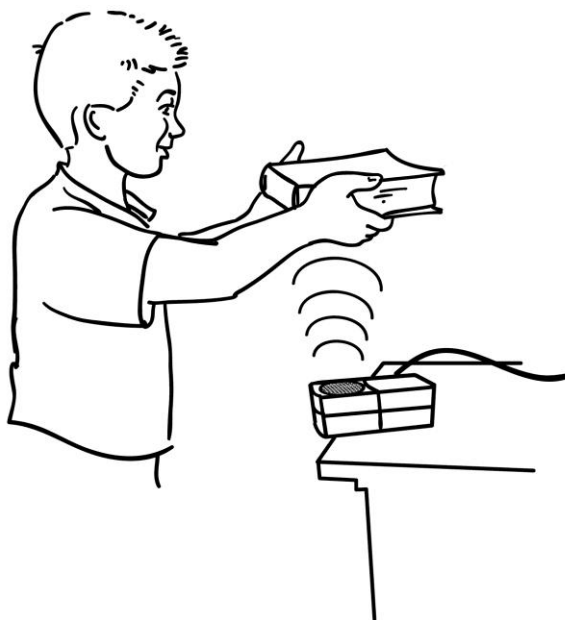
1. Do the following to set up the Motion Detector for data collection:
 - a. The detector (gold circle) is located on the part of the Motion Detector called the "head." Rotate the head open as shown here.
 - b. Locate the switch under the head and set it to the Normal position.
 - c. Rotate the head back down.
 - d. Make sure the Motion Detector is connected to LabQuest.
 - e. Choose New from the File menu.
 - f. Tap the Graph tab. Choose Show Graph from the Graph menu and select Graph 1. This will display a graph of position vs. time.



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2. Collect data by following the steps below.

- a. Put the Motion Detector on a table or chair with the detector facing up towards the ceiling. Make sure there is nothing in the path of the signal coming out of the detector.
- b. Have one person stand holding a book about 0.5 meters above the Motion Detector.
- c. Look at the screen and start data collection.
- d. Slowly move the book straight upwards and watch what happens on the graph on the screen.
- e. Now slowly move the book down toward the sensor, but don't get closer than about 15 cm. Watch to see what happens when you move closer to the Motion Detector.
- f. Now, move the book upwards very quickly and watch what happens.
- g. Data collection will stop after five seconds.
- h. You can try it again by starting data collection again.

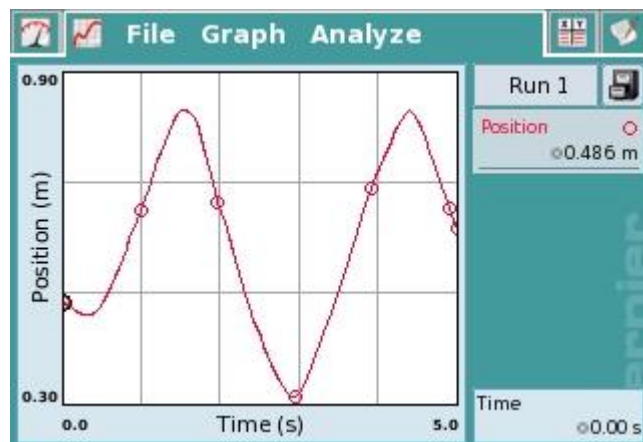


3. Use your experiences in Step 2 to complete the statements in the Observations Sheet below.

Observations Sheet	
1. When I slowly move the book up and away from the Motion Detector,	
2. When I slowly move the book down and towards the Motion Detector,	
3. When I lift the book up very quickly the graph is different than when I move it slowly because	

Part II Make a Snake with a Motion Detector

4. In this part of the activity, you will match the shape of the snake. An example of what this might look like is shown to the right. Before you start, think about what happened when you moved the book in front of the Motion Detector. Fill in the blanks below as a plan for matching the shape on the Graph.



I will start with the book _____ meters above the Motion Detector. I will

move the book _____ (up or down) so the book is about _____ meters above the Motion Detector. Then, I will move the book _____ (up or down) until it is about _____ meters from the Motion Detector. Then, I will move the book _____ (up or down) until it is about _____ meters from the Motion Detector. Finally, I will move the book _____ (up or down) until it is about _____ meters above the surface of the Motion Detector.

5. Start data collection, then follow the plan you wrote in Step 4, trying to match the snake.
6. If the data you collected matches the snake shape on the screen, congratulations! If you want to try to match the snake again, just start data collection and repeat the plan you wrote in Step 4.

Good job!