TEACHER INFORMATION

Walk the Line:
Straight Line Distance Graphs

1. There are currently four Motion Detectors that can be used for this lab activity. Listed below is the best method for connecting your type of Motion Detector. Optional methods are also included:

    Vernier Motion Detector: Connect the Vernier Motion Detector to a CBL 2 or LabPro using the Motion Detector Cable included with this sensor. The CBL 2 or LabPro connects to the calculator using the black unit-to-unit link cable that was included with the CBL 2 or LabPro.

    MDC cable

    CBR: Connect the CBR directly to the graphing calculator's I/O port using the extended length I/O cable that comes with the CBR.

    Optionally, the CBR can connect to a CBL 2 or LabPro using a Motion Detector Cable. This cable is not included with the CBR, but can be purchased from Vernier Software & Technology (order code: MDC-BTD).

    I/O cable

    CBR 2: The CBR 2 includes two cables: an extended length I/O cable and a Calculator USB cable. The I/O cable connects the CBR 2 to the I/O port on any TI graphing calculator. The Calculator USB cable is used to connect the CBR 2 to the USB port located at the top right corner of any TI-84 Plus calculator.

    Optionally, the CBR 2 can connect to a CBL 2 or LabPro using the Motion Detector Cable. This cable is not included with the CBR 2, but can be purchased from Vernier Software & Technology (order code: MDC-BTD).

    I/O cable   USB cable

    Go! Motion: This sensor does not include any cables to connect to a graphing calculator. The cable that is included with it is intended for connecting to a computer's USB port. To connect a Go! Motion to a TI graphing calculator, select one of the options listed below:

    Option I–the Go! Motion connects to a CBL 2 or LabPro using the Motion Detector Cable (order code: MDC-BTD) sold separately by Vernier Software & Technology.

    Option II–the Go! Motion connects to the graphing calculator's I/O port using an extended length I/O cable (order code: GM-CALC) sold separately by Vernier Software & Technology.

    Option III–the Go! Motion connects to the TI-84 Plus graphing calculator's USB port using a Calculator USB cable (order code: GM-MINI) sold separately by Vernier Software & Technology.

2. When connecting a CBR 2 or Go! Motion to a TI-84 calculator using USB, the EasyData application automatically launches when the calculator is turned on and at the home screen.
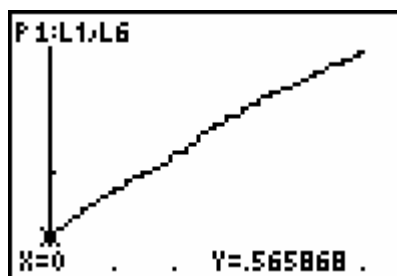
3. Place the Motion Detector at waist-high level for the walker. The walker should not be closer than 0.5 meter to the detector when data collection begins. Clear the area of other materials such as desks or chairs.

4. The walker must maintain a constant rate while walking directly away from the Motion Detector.
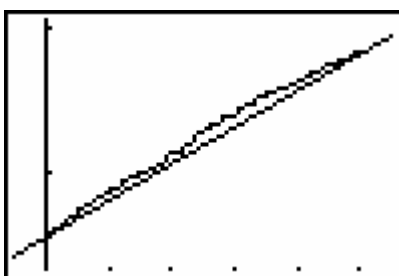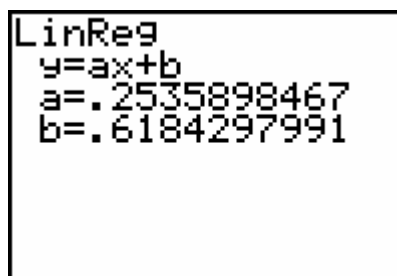
SAMPLE RESULTS
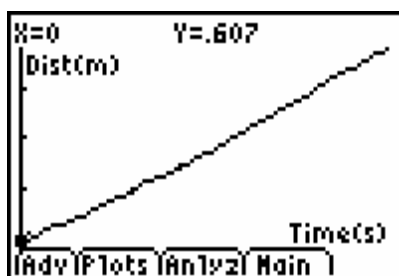
Raw data in EasyData

Data regraphed, with trace to y-intercept

Optimized model fit

Calculator regression result

DATA TABLE

y-intercept *b*	0.565 m
optimized slope *m*	0.25 m/s
optimized line equation	y = 0.565 + 0.25*x
x_1, y_1	0, 0.565
x_2, y_2	1.6, 1.01
regression line equation	y = 0.62 + 0.25*x

ANSWERS TO QUESTIONS

1. The slope determined by the two-point calculation is nearly the same as the one found by trial and error.

 Real-World Math Made Easy

2. The slope and intercept determined by the calculator are similar to those obtained by trial and error. They aren't exactly the same, but I wouldn't expect them to be the same. The trial and error line used only one point to determine the *y*-intercept, while the calculator used all the points.

3. Slope represents a change in distance from the Motion Detector divided by a change in time.

4. The slope has units of meters per second, or m/s.

5. The slope represents the velocity of the walker.