TI-84 Calculator and CBR2 Sonic Motion Detector

Objectives:

1. Learn to interface the TI-84 with your computer
2. Download applications to the TI-84
3. Interface the TI-84 to the CBR motion detector
4. Gather data from the CBR and display the data graphically on the TI84
5. Analyze the data by fitting an equation to the curve.

Materials:

Computer connected to the Internet
TI-84 calculator
CBR motion detector
I/O (input/output) interface cable
USB link cable

Procedures to ready the TI-84 for applications:

I. Downloading Applications for the TI-84/84 series of calculators:

1. Connect your computer to the Internet and connect to
   http://education.ti.com/educationportal/sites/US/homePage/index.html
2. Under downloads click on O/S and applications
3. Under the **TI-83 Plus Family, TI-84 Plus Family** click on **Science Apps**.
4. Find **Vernier EasyData App** and click "download."
5. Click **EasyData (English)** and save the program to your computer desktop.

II. Installing Applications to the TI-84:

1. On the Vernier EasyData App page click "**Download Instructions**."
2. Look at item number 2.
3. Click **TI Connect Download and Installation Instructions**.
4. Follow the instructions for downloading and installing the TI Connect software.
5. Connect TI-84 to the computer with the USB link cable.
6. The calculator will automatically turn on and the computer will go through "install hardware" routine.
7. Open the TI Connect program.
8. Drag and drop the **EasyData** file from the desktop to the **TI Device Explorer** icon within TI Connect.
9. Disconnect the TI-84 from the computer and press the "**APPS**" key. Look for "**EasyData**." If you see it, you are good to go! Congratulations!

Interfacing the TI-84 and CBR2:

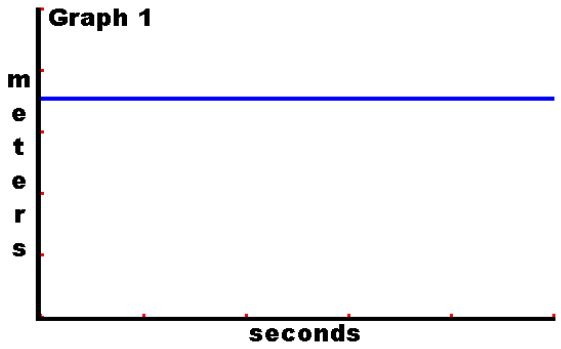
1. Connect the **TI-84** to the **CBR2** with the **I/O** interface cable.
2. Turn on the calculator.
3. Press **"APPS"** button.
4. Select **EasyData** and press **"Enter."**

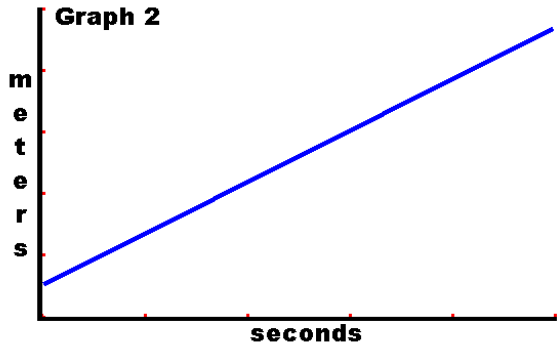
You will notice the calculator "**ticking**" as a green **LED** flashes. The calculator is now ranging the distance from the sonic emitter/detector to some location the sonic (sound) wave is reflecting off of.

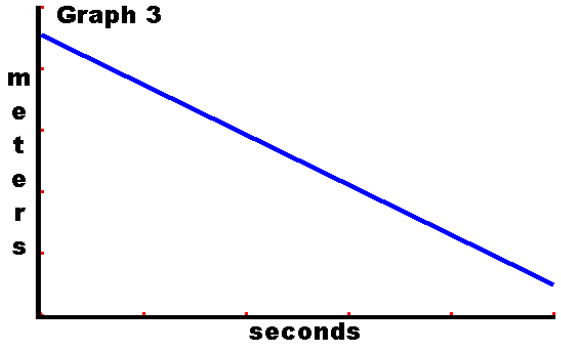
5. Hold your hand over the **CBR2** and move it up and down. What do you notice?
6. Press the key under **"Start."**
7. The ***instant*** you press the key under **"OK"** the **CBR2** will begin emitting a very rapid sonic pulse and recording data for 5 seconds.
8. The data will then be displayed on the calculator in **d/t** graph.
9. Press the button under "**Anlyz**."
10. Select a function and press "**Enter**." The calculator will generate a function and establish constants for "**a**" and "**b**."
11. Press "**OK**" and the calculator will generate a plot of the function.
12. Press "Main" to return to the main screen.

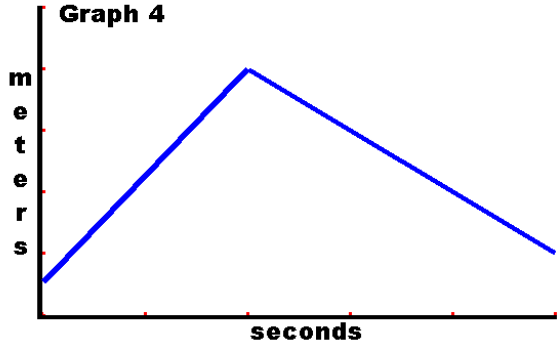
TI-84 and CBR2 Activity:

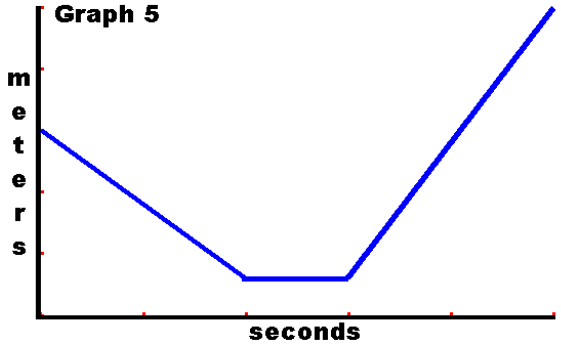
1. Carefully study the graphs on the following pages.
2. Determine as best you can how the distance-time graph was produced.
3. Move the **CBR2** in a manner to best approximate the 18 graphs.
4. For credit, show Mr. Furrey each successfully completed graph.
5. GOOD LUCK!

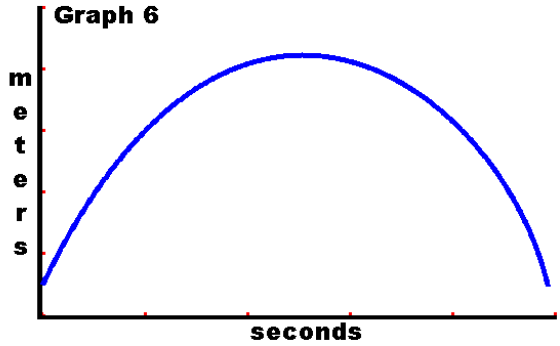

Graph 1
meters
seconds

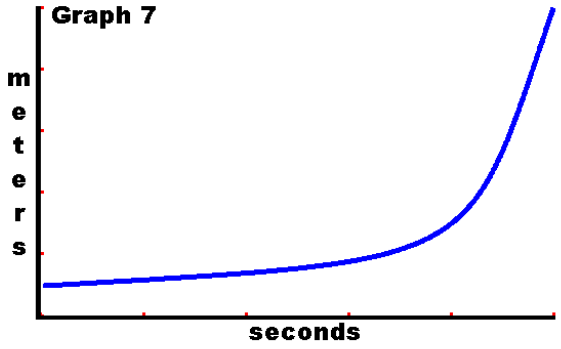

Graph 2
meters
seconds

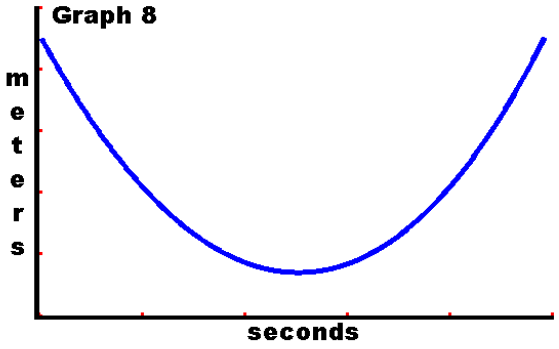

Graph 3
meters
seconds

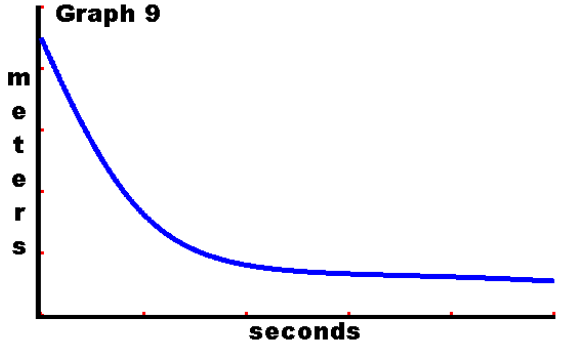

Graph 4
meters
seconds

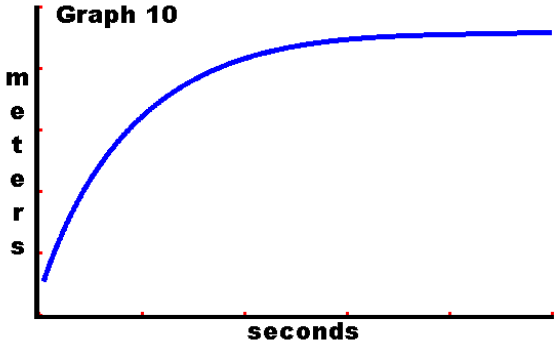

Graph 5
meters
seconds

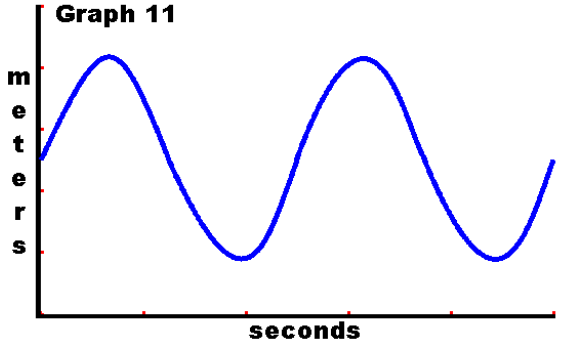

Graph 6
meters
seconds

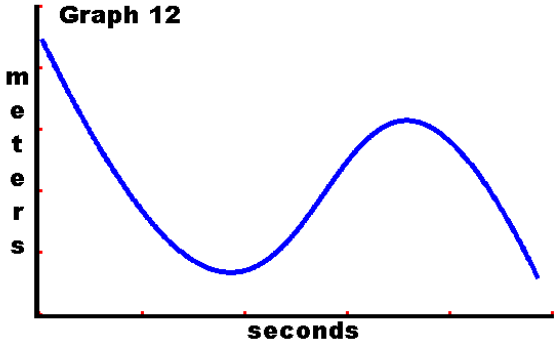

Graph 7
meters
seconds

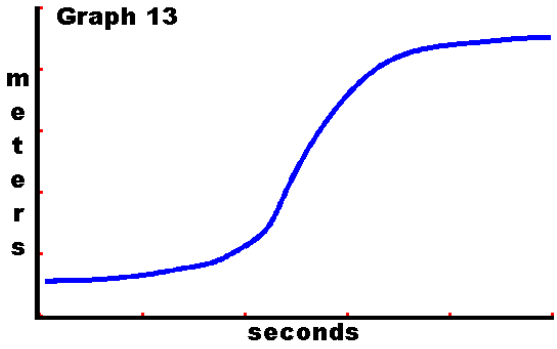

Graph 8
meters
seconds

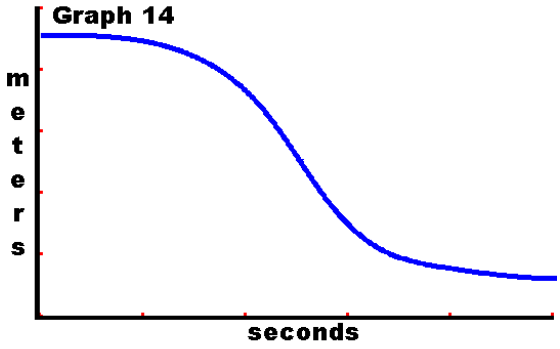

Graph 9
meters
seconds

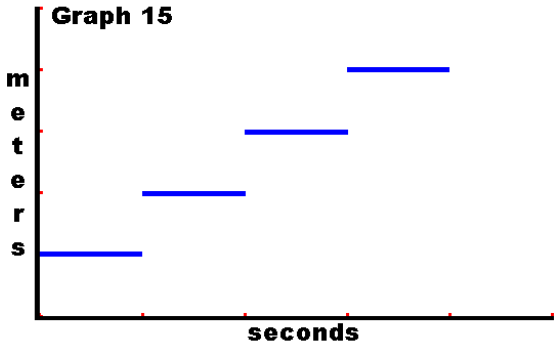

Graph 10
meters
seconds

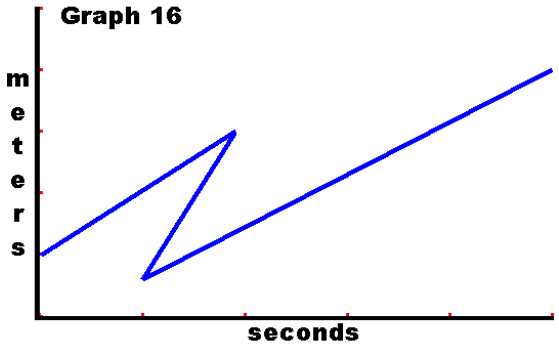

Graph 11
meters
seconds

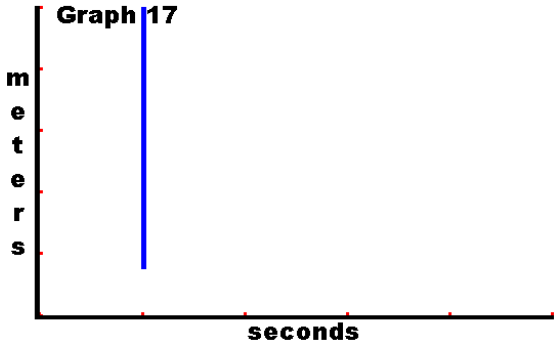

Graph 12
meters
seconds

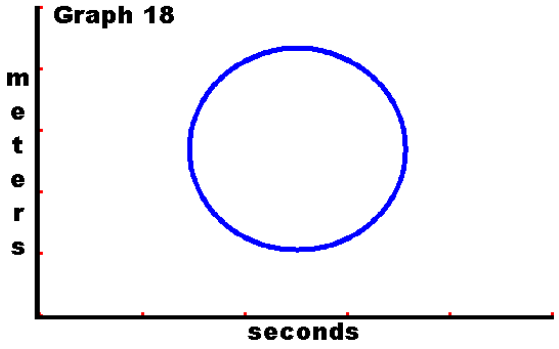

Graph 13
meters
seconds


Graph 14
meters
seconds


Graph 15
meters
seconds


Graph 16
meters
seconds


Graph 17
meters
seconds


Graph 18
meters
seconds