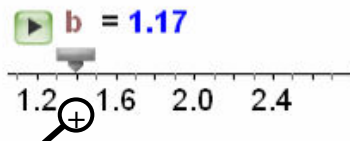


Main Actions in Fathom

- A. Create a table:** If your data is already in a collection in the workspace, select the Collection by clicking on it. Click on the “Table” icon and drag it into the workspace wherever you want it. If you want to enter new data, click on <new> and type in the variable name. Enter values in the column like a spreadsheet. Fathom will make a collection box to store your data. You can delete everything but this collection box and your data will still be there.
- B. Create a graph of data:** First open a table to see the variables you want to graph. Then click on the “Graph” icon, and drag it into the workspace wherever you want it. Resize the graph by dragging its edges or corners. Click on the table header for one variable you want to plot and drag it to one of the axes on the graph and drop it there. Then drag the other variable header from the table to the other axis.
- C. Add a graph of a function to a data plot:** After you make the data plot (above), right click on graph and select “Plot Function.” Enter the equation you want to graph then click “OK.”
- D. Create a graph of a function with no data:** Make sure no collections are selected (click on an empty spot in the workspace. Open a table and graph. On the table, click on “<new>” to create the variable names you want. Drag these onto the axes of the graph. Right click on the graph and choose “Plot Function.” Enter the equation you want to graph then click “OK.”
- E. Create sliders:** Drag as many slider icons into your workspace as you want. They will initially be named “V1”, V2”, etc. Highlight these names and enter new names if you want. Now you may use those as variables in your equations. You can highlight the number on the slider and type in a new number or drag the pointer back and forth to change the value. You can also enter units after the number if you want.
- F. Helpful hint for scaling sliders and graphs:** If the graph moves too much when you adjust the slider, you will want a smaller interval so you can control the values at a more accurate level. The best way to do this is to hold down the CTRL key and place the mouse on the number line exactly under the pointer. A magnifying glass with a + sign will appear there (see below). This means if you click there, the slider will zoom in on that part of the number line. Repeat if necessary. Holding CTRL and SHIFT together will give a magnifying glass with a – sign which let’s you zoom back out.



Alternatively, you can use the hands to stretch, compress, or translate the slider’s number line. Also, you can make the slider longer by dragging one of its edges out. This can be helpful for getting finer control over your adjustments. A third alternative, available only for graphs, is to hold down control key and drag a box around the region you want to zoom into, and the graph will automatically resize to show only that region.

- G. Change the scale on a graph or slider:** Hold the mouse over an axis and a hand will appear. If the hand is in the middle, it will be perpendicular to the axis, and when you hold down the mouse button, you can move the axis side to side. If the hand is near one end, it will point in the direction of the axis, and when you hold down the mouse button, you can pull that end in or move it out. Try to move slowly so you can see what is happening.
- H. Add computed values to data:** Suppose you have distance and time as variables for a data set and you want to compute a corresponding speed for each data point. Simply click on "<new>" in the data table and type a new variable name "speed" and press Enter. Then right click on the variable name and choose "Edit Formula" and type in the appropriate formula (in this case distance/time) and select "OK."
- I. Add a column for first differences:** As above, create a new data column with a title like "Delta_Time" or "dt." When you enter the formula you will use the "prev" command to obtain the value of the variable for previous data point. For example, the formula "Time-prev(Time)" will compute the difference in the variable "Time" from the previous data point to the current one. Note, you may need to sort your data to make this work properly (see below).
- J. Sort Data:** Right click on the variable in the table that you want to sort by and choose "sort ascending" or "sort descending."
- K. Add a movable line:** Right click on a graph and choose "Add Movable Line." The equation will appear below the graph. Move the mouse over the graph and a double headed arrow will appear. If you place this near the center of the line, the arrow will be straight and you can hold down the mouse button and translate the line. If you place the arrow near and end, it will become curved, and you can rotate that end. To remove the line, right click on the graph, and choose "Remove Movable Line."
- L. Add a regression line:** Right click on a graph with data, and choose "Least-Squares Line." The equation and r^2 value will be displayed. To remove the line, right click on the graph and choose "Least-Squares Line" again to uncheck it.
- M. Import data:** From a web browser, drag the url into fathom and drop it on the workspace. From a word processor or spreadsheet document, copy the data, then in Fathom, drag the collection icon to the workspace and paste (ctrl-v or Edit → Paste Cases).
- N. Add Units:** Right click on a data table, and choose "Show Units." This will add a row to the table where you can enter units. Adding units to a column will give everything associated with that column those units. This includes where the variable appears in equations, such as for graphs of functions. Fathom will perform basic unit analysis for you at this point and assign other quantities appropriate units and will let you know if the units don't match up. You can add units to sliders and to parameters in formulas by entering the unit label right after the appropriate number.
- O. Help:** See cool "Demo Movies" and useful "Fathom Help" under the Help menu.

Collecting Data in Fathom using a Sensor

1. Connect the motion detector to the computer in the following way:



CBR Motion
Detector



DIG/Sonic Cable



LabPro or CBL
Interface

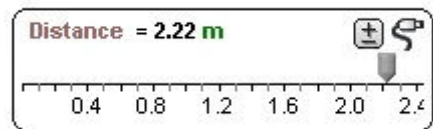


USB Cable

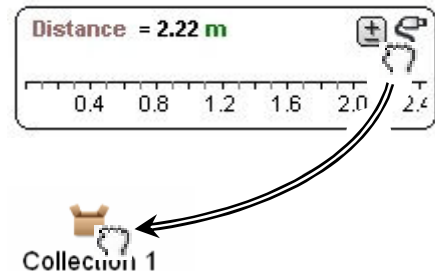


Laptop

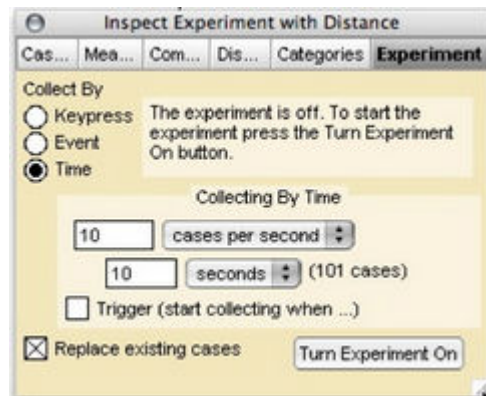
2. In Fathom, make a distance meter by clicking on the meter icon and dragging it to the document. The new meter gets the name “Distance” and should begin reporting the distance. If not, make sure everything is turned on and plugged in correctly.



3. Make a new, empty collection. Drag the plug from the *Distance* meter and drop it on the collection. Notice that the name of the collection becomes “Experiment with Distance” and that the collection icon changes to show that the collection is an experiment collection. Also, the inspector for the collection opens to the Experiment panel.



4. Adjust the data collection rate (“cases per second”) and the duration of the experiment (“seconds”) as desired, then click “Turn Experiment On” when you wish to begin collecting the data. You may now create data tables, graphs, and perform other operations to analyze the data.



Note: Other data sensors can be attached and used in a similar manner.

Transferring data from the calculator to Fathom

1. Once you have collected your data, press [ENTER] to return to the menu from the graph then choose "QUIT" The screen should indicate that TIME is stored in L1 and DIST is stored in L2.
2. Make sure your calculator can communicate with your computer:

Connect the calculator to the computer with a USB cable.



Click ok if any dialog boxes come up asking to install drivers.

3. Make sure that the TI Connect software is on your computer:

Look for this yellow and blue icon on your desktop:



or go to Start → Programs → TI Tools → TI Connect

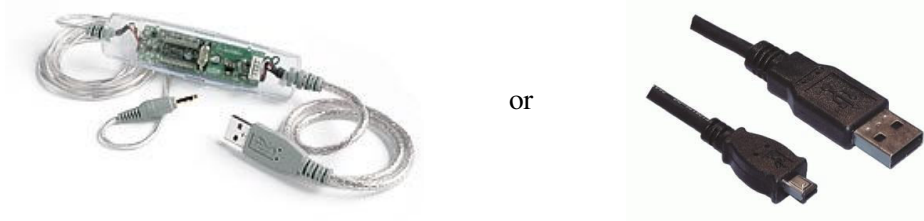
If TI Connect is not on your computer, open a browser and go to http://education.ti.com/educationportal/sites/US/productDetail/us_ti_connect.html. Then follow the instructions to download and install the software.

4. Click on "TI DeviceExplorer." Choose your calculator from the list and a Device Explorer window will appear. Expand the "List" menu by clicking on the "+" sign next to it. Highlight L1 and L2 by holding down the shift key while you click on them. Then right-click and choose "Open." A spreadsheet will appear. Select all of the data by clicking on the upper-left grayed-out cell. Copy the data by pressing CTRL-C on the keyboard.
5. Open Fathom. Drag in a "Collection" box. Paste in the data by pressing CTRL-V.


Transferring data from the calculator to Fathom on a Mac

1. Once you have collected your data, press [ENTER] to return to the menu from the graph then choose "QUIT" The screen should indicate that TIME is stored in L1 and DIST is stored in L2.
2. Make sure your calculator can communicate with your computer:

Connect the calculator to the computer with a USB cable.



Click ok if any dialog boxes come up asking to install drivers.

3. Make sure that the TI Connect software is on your computer: 
If TI Connect is not on your computer, open a browser and go to http://education.ti.com/educationportal/sites/US/productDetail/us_ti_connect.html. Then follow the instructions to download and install the software.

4. From the TI-Connect folder launch TI Data Editor. A New Document Chooser window opens up. Select [Open From Device]. Navigate your way to L₁ and choose [Open]. Return to the New Document Chooser window and in like manner, open L₂.



5. Now open a Microsoft Excel workbook. Return to the L₁ window. Select all of the data by clicking on the upper-left grayed-out cell. Copy the data by pressing [open apple]-C on the keyboard. Go to the Excel worksheet and paste the data in A1. Now, copy the L₂ data and paste it into B1. You may quit TI Data Editor.
6. Copy the data in the two columns in the Excel worksheet, then Launch Fathom. Drag in a "Collection" box, and then paste the data into the "Collection" by pressing [open apple]-V. You may quit Excel.