Logger Pro Video Analysis Guide

The items in the table of contents are links. Click on an item to go directly to that part of the document.

The screenshots and GIFs in this guide were made using a Mac, so the screens will look a little different than on Windows, but the options and their locations are the same.

1. More Resources

- [Video in Logger Pro](#) guide from Vernier
- Logger Pro comes with a video analysis tutorial
  - In Logger Pro, go to the File menu and select Open.
  - Open the following folders: Logger Pro → Experiments → Tutorials
  - Open the file called 12 Video Analysis.cmbl and follow the instructions.
- Google and YouTube! Don't be afraid to type your question or what you are trying to do into a search and look for resources.

2. Tool Summary

2.1 Video Tools

The video menu appears to the right of your movie. If it isn't visible, make sure you've selected your movie window and click �.

- **Pointer Tool**: Select points in your video
- **Points Tool**: Add points (see [Track an Object](#))
- **Origin Tool**: Set origin (see [Set Origin](#))
- **Scale Tool**: Set the scale (see [Set Scale](#))
- **Ruler**: Drag your cursor along an object in the video to measure it
- **Active Series**: Add a data series or select which series is active (see [Track Multiple Objects](#))
- **Display Trail**: Toggle to set whether points from previous frames are visible (see [Track an Object](#))
- **Show Origin**: Toggle to set whether the origin is visible (see [Set Origin](#))
- **Show Scale**: Toggle to set whether the scale is visible (see [Set Scale](#))

2.2 Graph Tools

These are on the menu along the top of the screen and are useful for analyzing graphs.

- **Zoom In**

- **Zoom Out**

- **Examine Tool**: Display the coordinates of a point on your graph (see Analyze Your Graphs)

- **Tangent Tool**: Display the tangent line with slope of a point on your graph (see Analyze Your Graphs)

- **Statistics**: Display statistics (such as mean, max, or min) for a selected portion of the graph (see Analyze Your Graphs)

- **Integral Tool**: Find the area of a section of the graph (see Analyze Your Graphs)

- **Linear Fit**: Find the line of best fit for a section of the graph (see Analyze Your Graphs)

- **Curve Fit**: Find the equation for non-linear graphs

3. Video Recording Tips

- Keep the camera still. It is better to set the camera on something, rather than try to hold it.
- The camera should be recording straight on since recording at an angle will distort distances.
- Make sure you have some kind of standard in the frame. A meter stick works well, but any object you know the size of will work. Make sure the entire object is visible in the frame.
- Your standard should be at about the same distance from your camera as the object you want to track. Ideally, your object should be moving right in front of or along the standard.
- Record somewhere with a lot of light. It may be helpful to use a light source such as an overhead projector or your phone's flash.
- Fill up as much of the frame as you can with the object's motion. If you are tracking vertical motion, it may be useful to record in portrait mode.
- A plain background will make the motion easier to track. Whiteboards work well for this.

4. Setting Up

4.1 Saving Your Work

1. Make a folder on a USB drive.
2. Save your video into that folder BEFORE doing anything in LoggerPro.
3. Open Logger Pro. Load your video and do your data collection.
4. Go to File along the top of the window and select Save As.
5. Give your file a name and save it in the folder you created.
6. To resume your work, plug the USB drive into the computer and open your LoggerPro file.

4.2 Load a Video

1. Make sure your video is saved to the computer. If you recorded it on your phone, you can either save it to Google Drive on your phone, then download the video onto the computer, or you can plug your phone into a USB port.
2. Go to the Insert menu along the top and select Movie…
3. In the window that opens, navigate to your video, then select it and click Open.
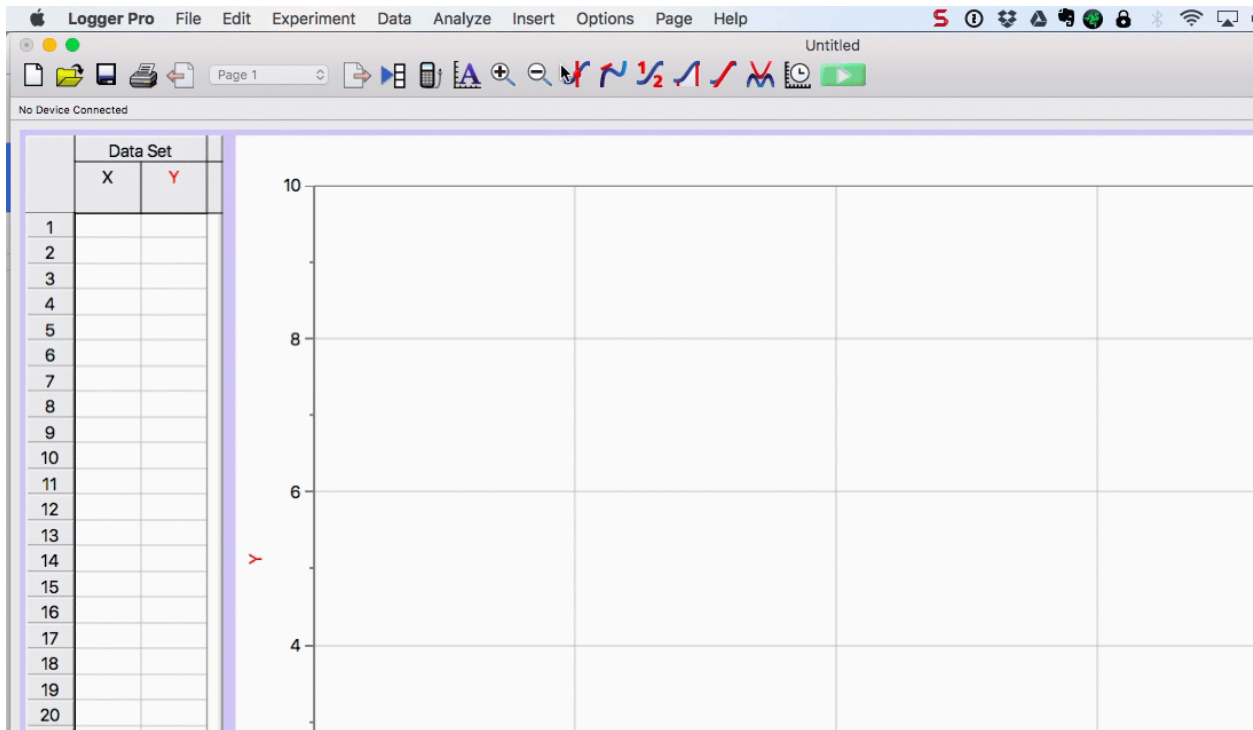
4.3 Set Movie Options

1. Make sure your video is selected in Logger Pro. It should be the top window and have small squares at the corners.
2. Go to the Options menu and select Movie Options…
3. Check the appropriate boxes and set any other options. The options you are most likely to use in this class are described below.
   a. **Override frame rate to: _____ fps.**
      Check this box if you recorded video in slow motion. With many phones, the correct frame rate will already be entered. If there is no value in the box, check your phone's settings or do a Google search to find the frame rate.
   b. **First VA point defines movie time zero.**
      This will use the first frame where you select a point as t = 0. This should almost always be checked.
   c. **Advance the movie _____ frame(s) after adding a new point.**
      When you select a point, the software will automatically advance one frame. In some cases, especially if you recorded in slow motion, you will have a large number of frames and don't need to select a point on every single frame to get useful data, so this option allows you to automatically skip ahead.
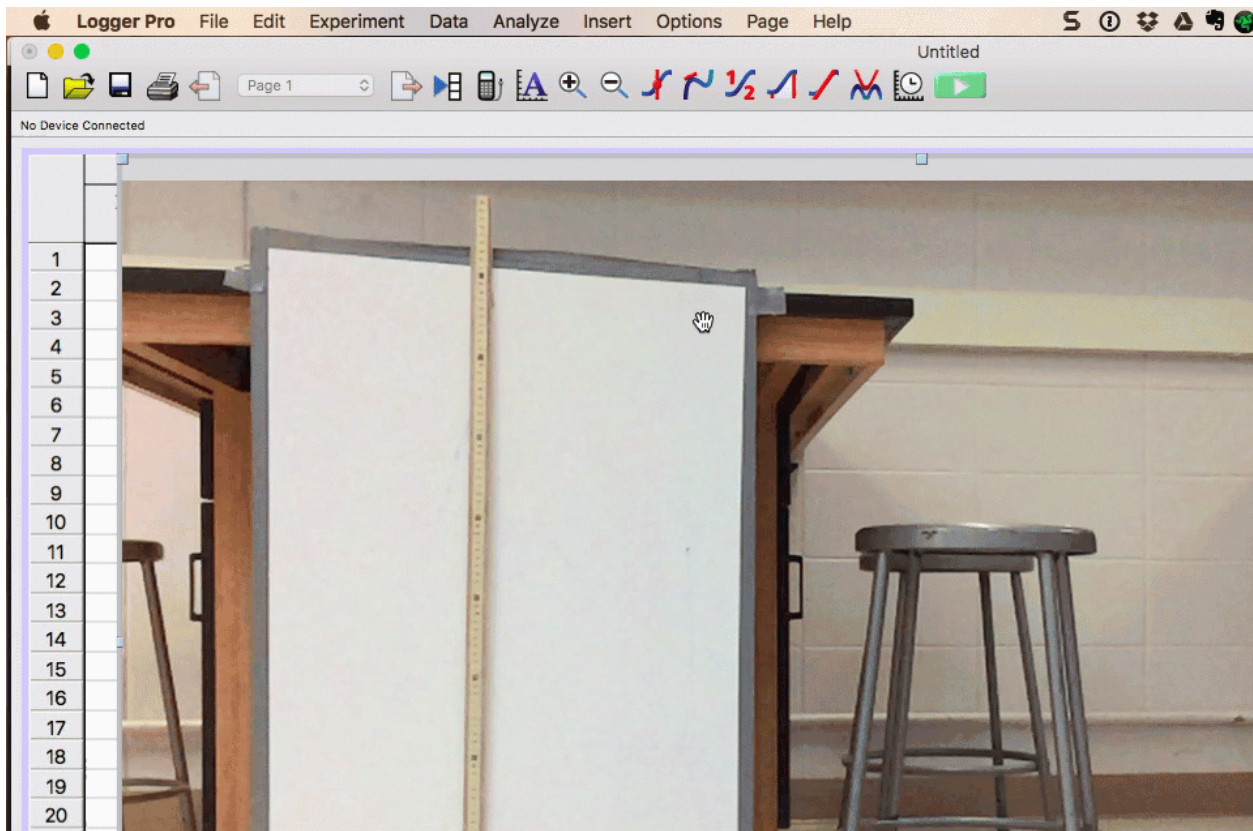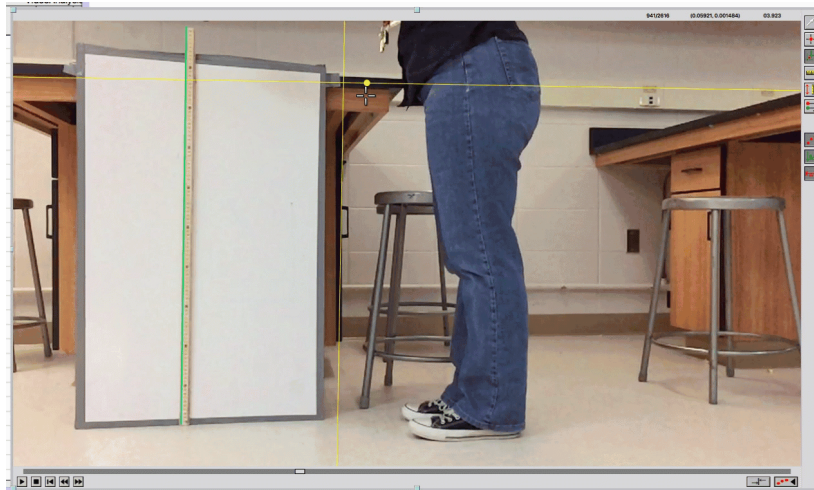
4.4 Set Origin & Rotate Axes

1. If the video toolbar is not visible, click in the lower-right corner of the movie to open the toolbar. It will appear on the right side of your video.

2. Select the origin tool from the toolbar.

3. Click on the point in the video you would like to use as 0,0

4. If you would like to rotate your axes (for example, to go along a ramp), select the origin tool from the toolbar.

5. The yellow line with a dot indicates the positive x axis.The positive y axis will always be 90° counterclockwise from the positive x axis.

6. If you are tracking motion at an angle, such as a cart on a ramp, it can be useful to rotate the axes in the video. Click the yellow dot near the origin and drag the axes to the angle you would like. You can also change the axes this way if your video is rotated 90°.

7. Click the display origin tool to toggle whether the origin is visible in the video.

4.5 Set Scale

1. If the video toolbar is not visible, click ![toolbar icon] in the lower-right corner of the movie to open the toolbar. It will appear on the right side of your video.

2. Select the scale tool ![scale tool icon] from the toolbar.

3. Click on one end of the standard in your video, and hold the button down as you drag your cursor to the other end. You may go vertically, horizontally, or along an angle.

4. When you release your mouse button, a dialogue box will open where you can enter the length and units for your standard. This will be used to determine distances in your video.
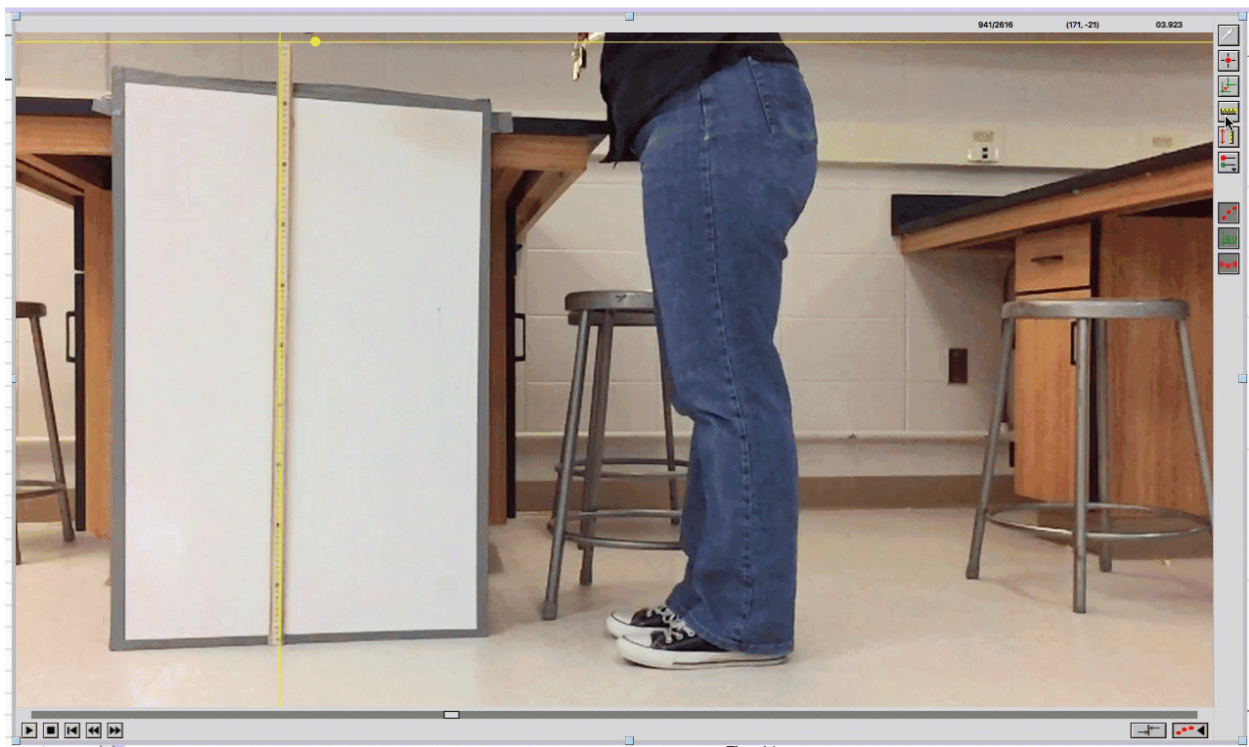
5. You can toggle whether the scale is displayed by clicking the display scale tool ![display scale tool icon]

Marta R. Stoeckel, 2019

5. Collecting Data with Video Analysis
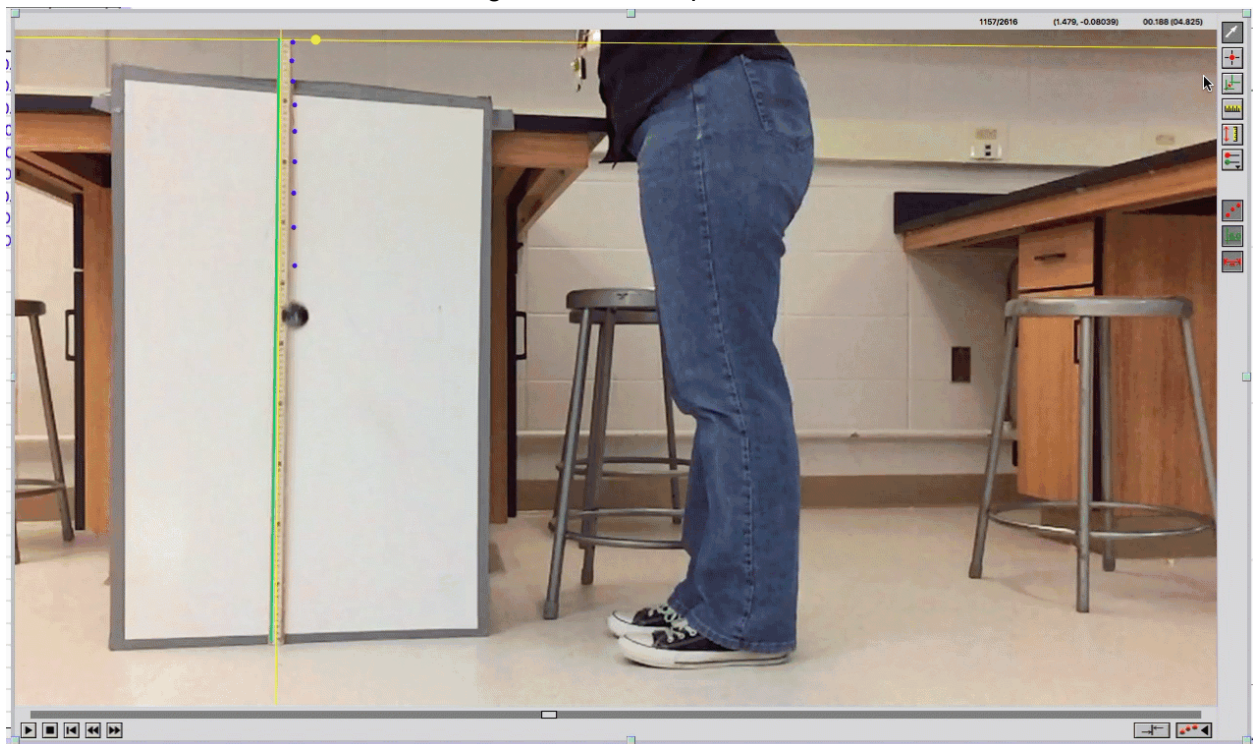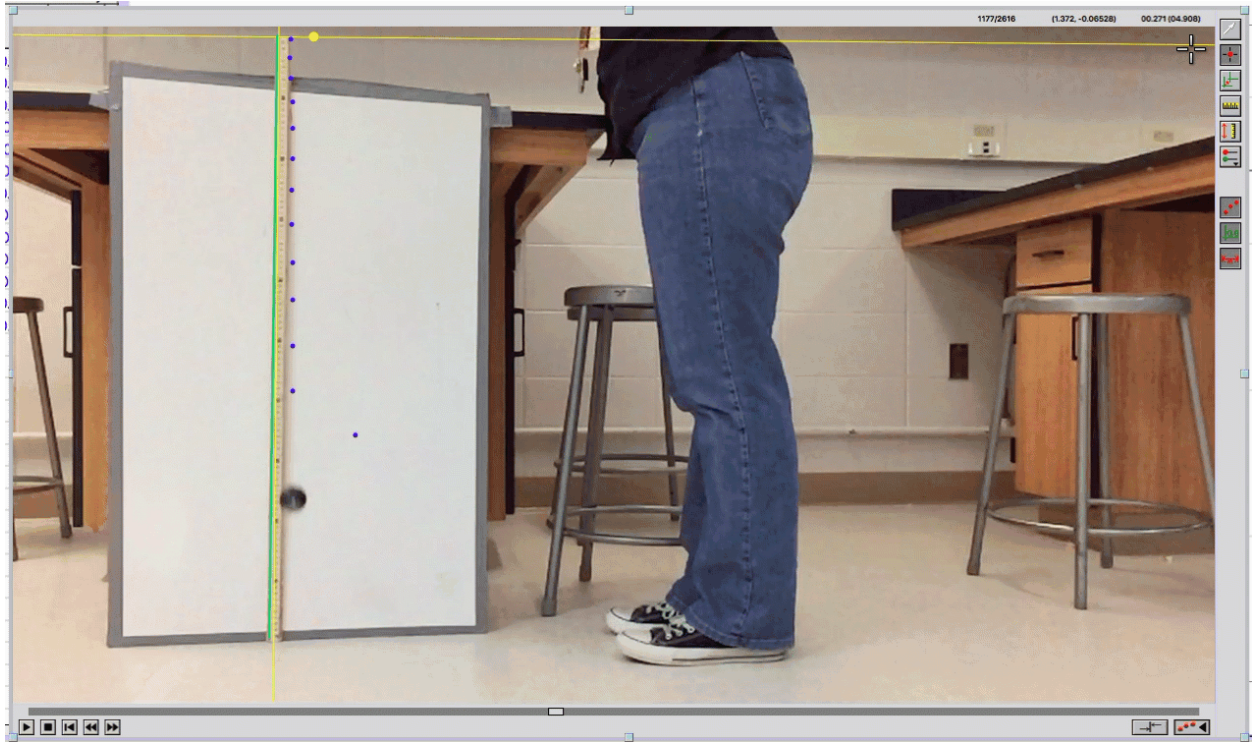
5.1 Track an Object

1. If the video toolbar is not visible, click ![icon] in the lower-right corner of the movie to open the toolbar. It will appear on the right side of your video.

2. Select the point tool ![icon] from the toolbar.
3. Select a spot on your object to track and carefully click on that point. A dot will appear where you clicked and the video will automatically advance.
4. Repeat until you have tracked the full motion you want to analyze. Make sure you click on the same spot on your object each time.

5. To turn off the points you've tracked in previous frames, click the track tool ![icon]. You

    can click the track tool ![icon] again to turn the points back on.

5.2 Delete a Point

1. Select the pointer tool ![pointer tool icon] from the toolbar.
2. Click on the point you want to get rid of to select it and hit delete on your keyboard.

5.3 Track Multiple Objects

Use these steps when you want to track several objects in the same video. If you are only tracking one object, you can skip this section.

1. Track the motion of your first object as usual.
2. Rewind the video to the start of the motion you would like to track.
3. If the video toolbar is not visible, click ▰▰◀ in the lower-right corner of the movie to open the toolbar. It will appear on the right side of your video.
4. Click the active series ▤ and choose Add Point Series.
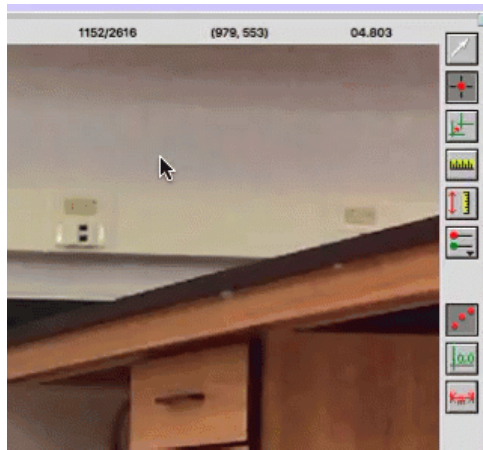
5. Select the point tool ⊹ from the toolbar and track the motion of your second object. The dots in the video should appear in a different color. Data points should also appear on your graph in a new color.
6. If the video does not automatically advance, use the controls at the bottom of the video ◀◀ ▶▶ .
7. Repeat these steps for all of the objects you would like to track.
8. To go back to a data set, click the active series tool ▤ and pick the series you would like to edit or add points to.
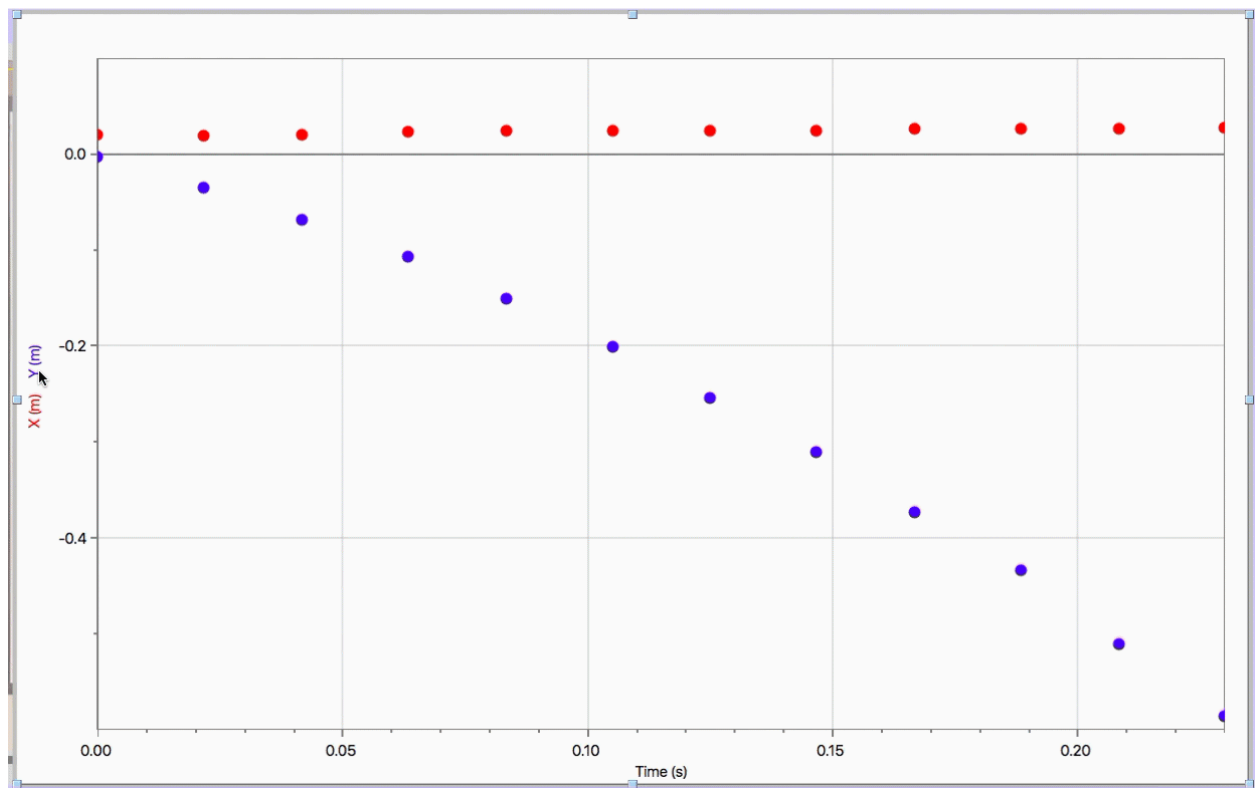
6. View & Edit Graphs

A graph window should be open by default in Logger Pro. Click on the graph to bring it to the front.
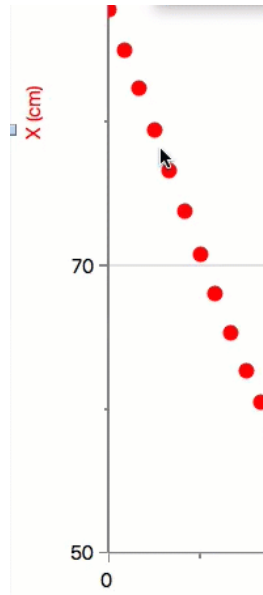
6.1 Select Axis Variable

Click on the axis title to select the graph you would like to display.

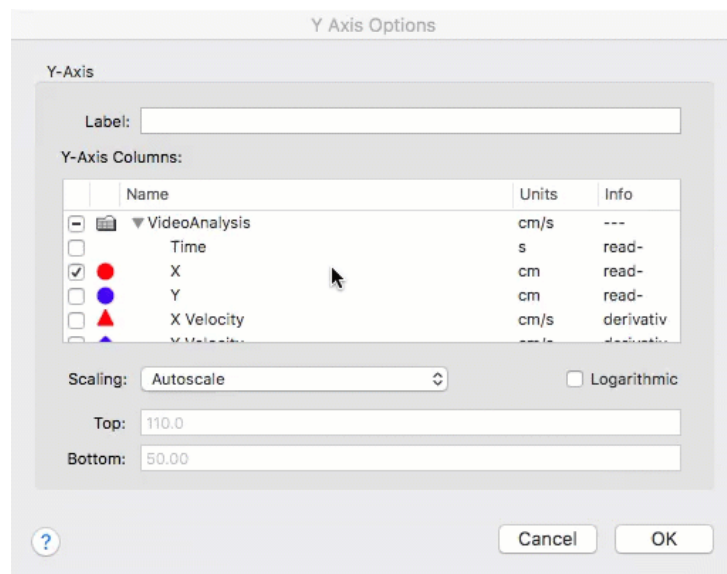## 6.2 Multiple Variables on the Same Axes

1. Click the axis title and pick More…

2. A window will open with all the available data sets. Check the boxes next to any you would like to display, then click OK. The graph will update.

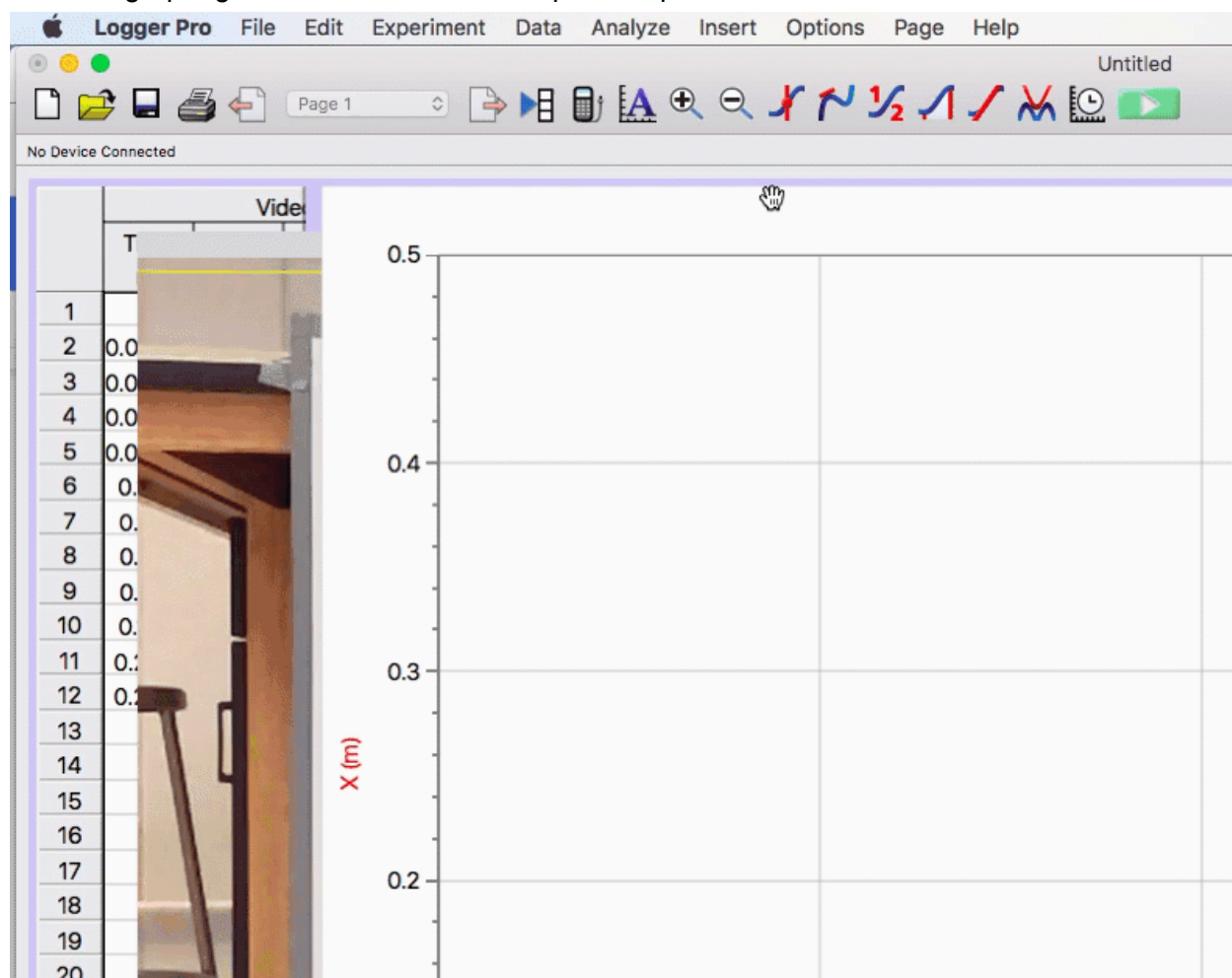3. You can repeat this process to turn off any variables.

6.3 Change the Visible Range

Change the visible range by clicking on the end of the axis, then use your keyboard to type in the maximum or minimum value you'd like to display.
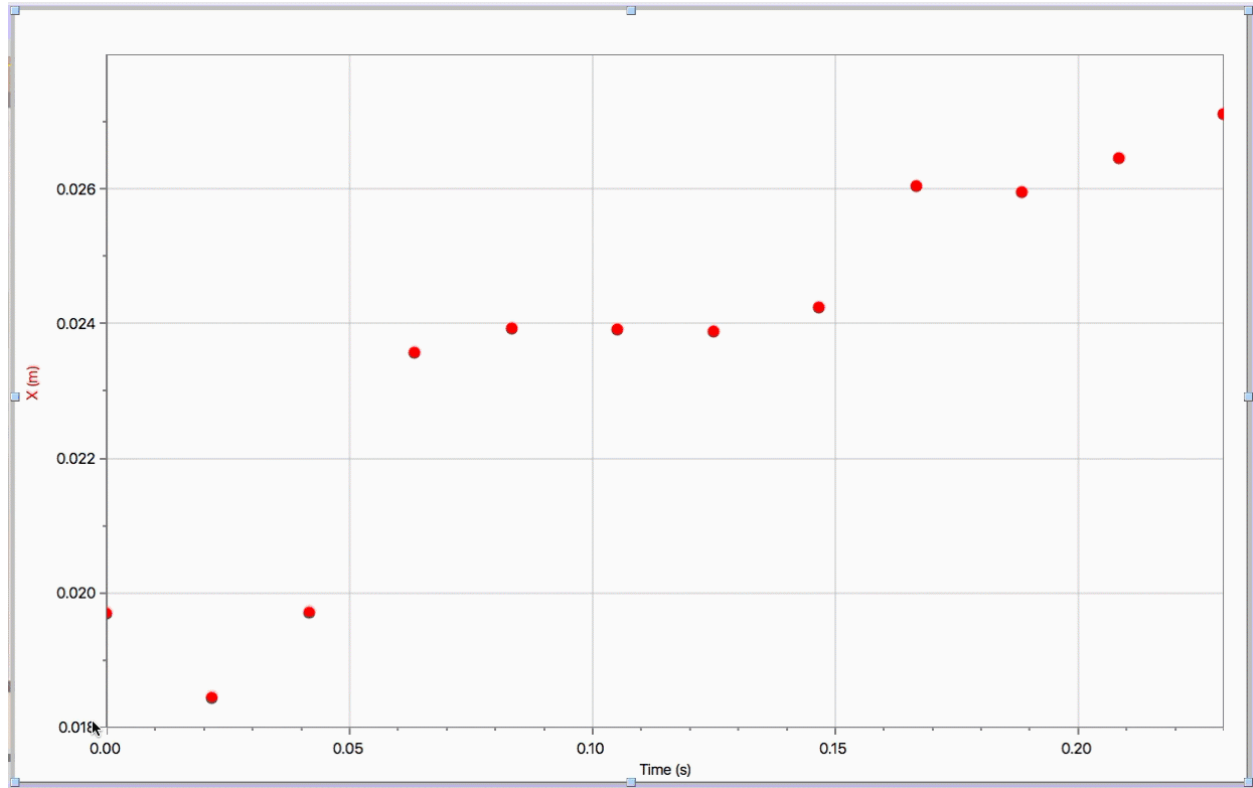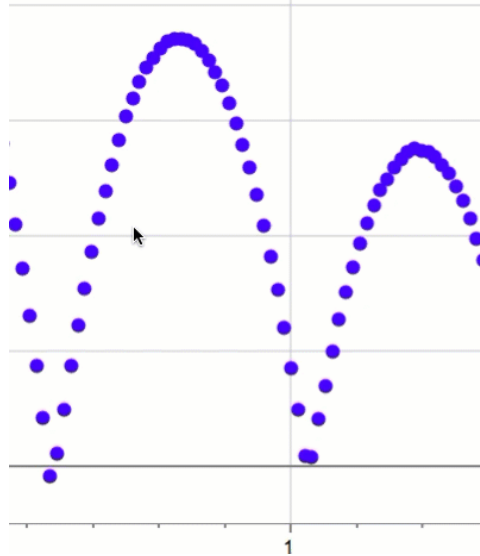
6.4 Add a Graph

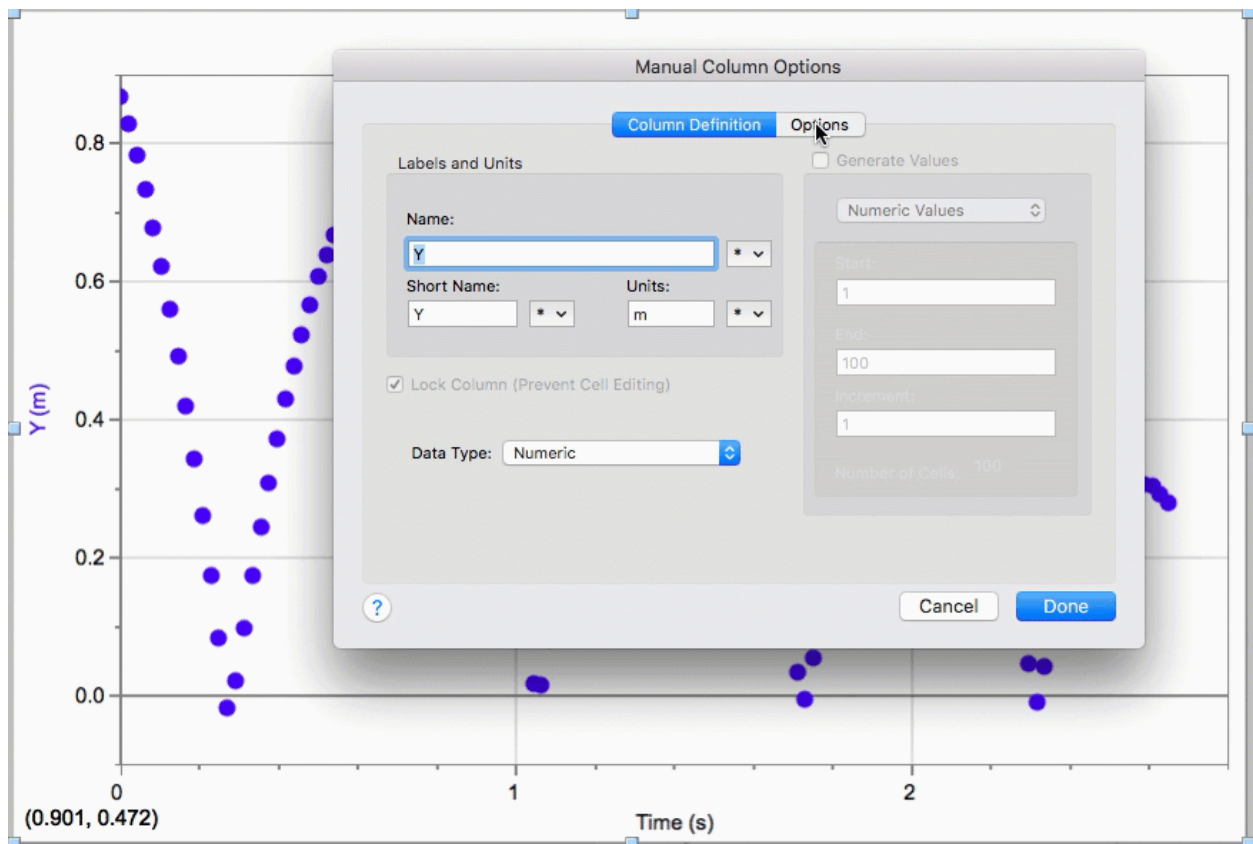To add a graph, go to the Insert menu and pick Graph.

6.5 Change the Appearance

1. Right click on the data set you would like to change the appearance of and select column options, followed by the variable you would like to edit.

2. In the window that pops up, select "Options". Use the drop-down menus to change the color, size, and style of the points, then hit "Done" to update your graph.

6.6 Add Error Bars

1. Right click on the data set you would like to change the appearance of and select column options, followed by the variable you would like to add error bars to.
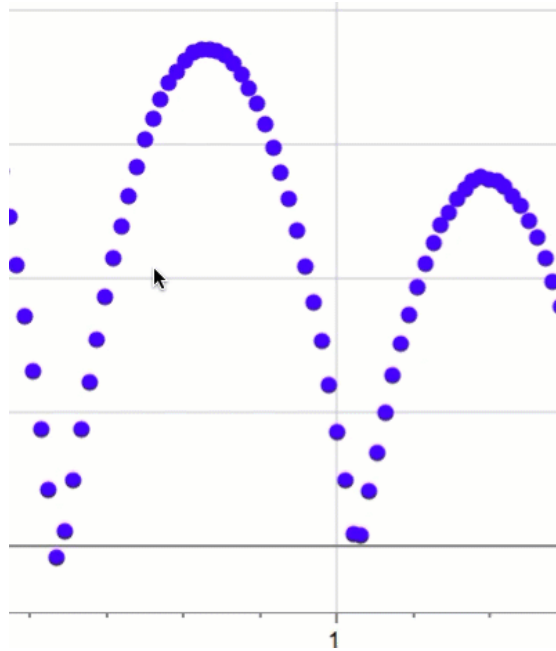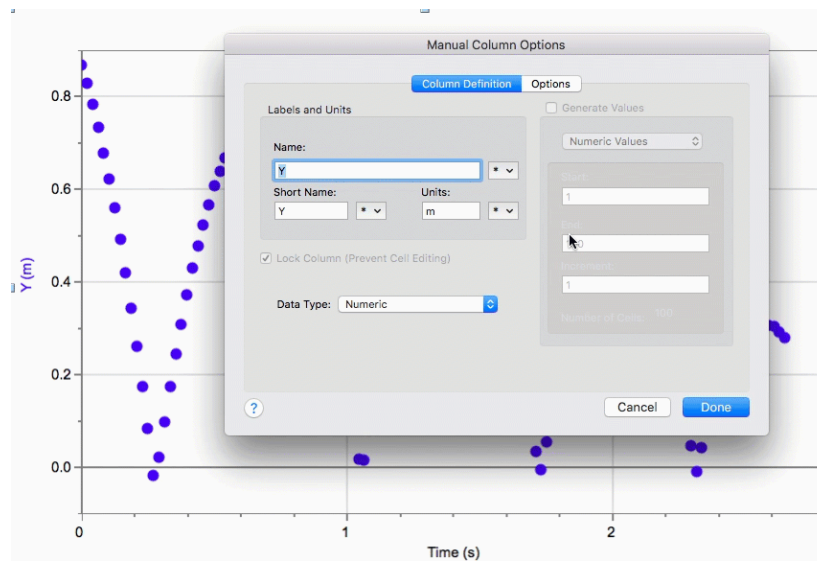
2. In the window that pops up, select "Options". Click the checkbox next to "Error Bar Calculations", then type in your uncertainty as the "Error Constant +/-".
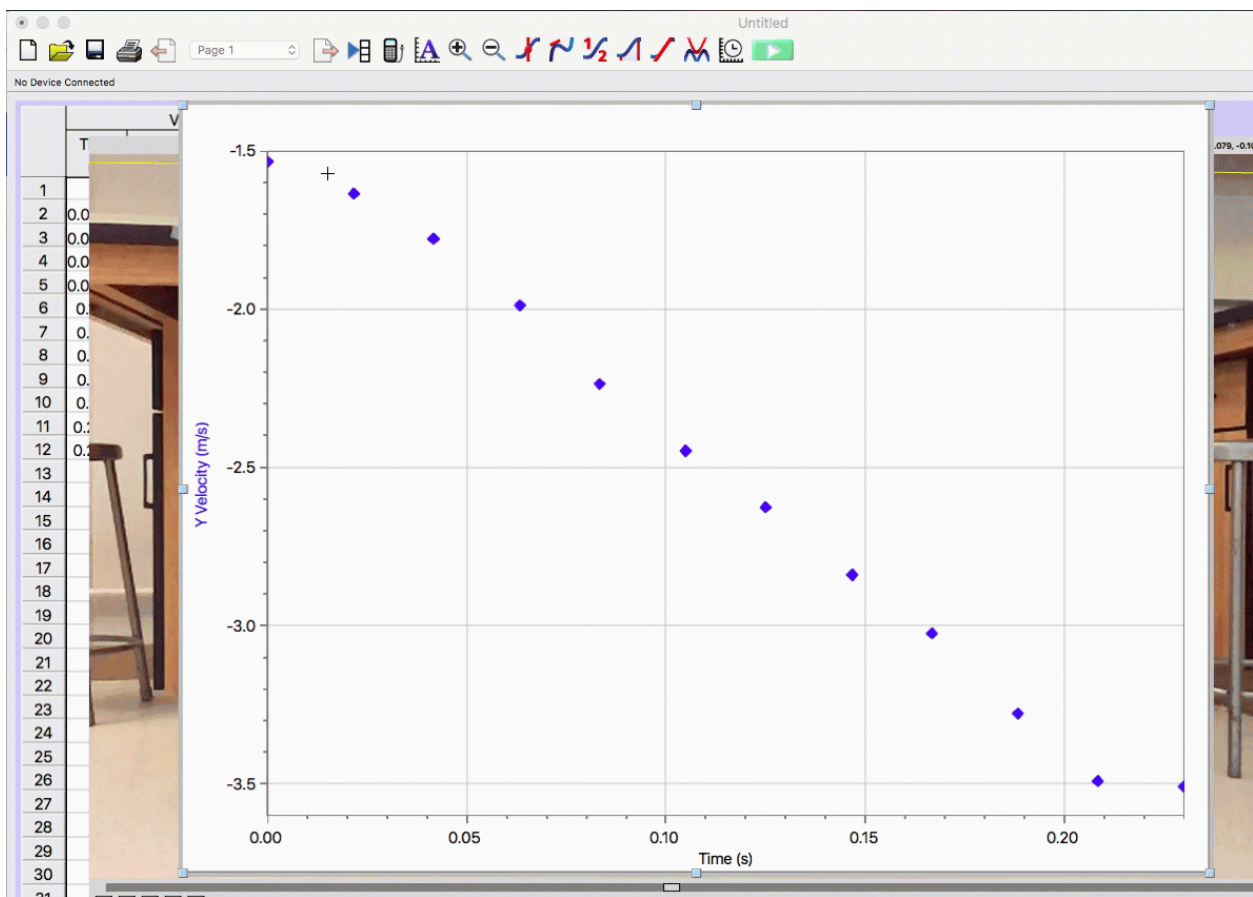
7. Analyze Graphs

7.1 Linear Fit

1. Click and drag to select a section of your graph.

2. Click the linear fit tool ![linear fit icon] from the toolbar along the top.
3. A line of best fit will appear on your graph, along with a box with the slope and intercept for the line.

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7.2 Create a Calculated Column & Linearize

1. Along the top of the window, go to the Data menu
2. Select New Calculated Column
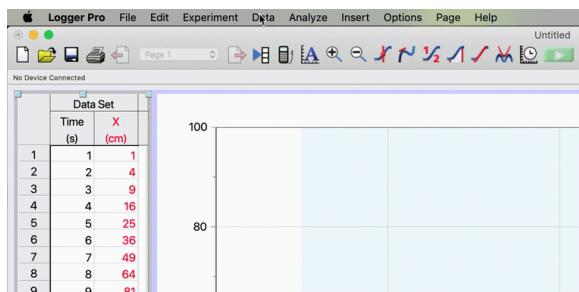
3. In the window that appears, give the calculated column a name, a short name based on the variable, and units.

4. Below the box for Expression, click **Variables (Columns)** ⌄ and chose the appropriate quantity. The name of that variable will appear in quotation marks in the expression box.

5. Type in the calculations you would like to do on that variable.

6. Update your axes to graph the new variable.
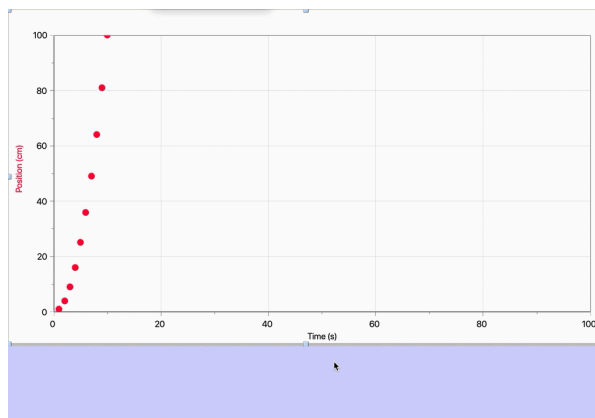
7.3 Other Graph Analysis Tools

1. To see the value of a specific point, you can select the examine tool from the toolbar along the top and move your mouse cursor to the point you are interested in.
2. If you'd like the slope at a specific point on a curved graph, you can select the tangent tool from the toolbar along the top and move your mouse cursor to the point you are interested.
3. If you'd like to find the area under your graph, highlight the section of your graph you are interested in and select the area tool from the toolbar along the top.
4. If you'd like to see statistics for a section of the graph, including the minimum value, the maximum value, and the mean, highlight the section of the graph you are interested in and select the statistics tool from the toolbar along the top.