

Motion Analysis with Logger Pro

1. Obtain a pre-recorded video clip or create your own with a standard digital camera. Make sure that you have a reference standard in the video. Using a meter stick or marking the wall with white tape often works well.
2. Open up Logger Pro. Click Insert → Movie... Navigate to the location of the desired movie on your computer's hard drive.
3. Resize the movie clip (by clicking and dragging one of the corners) so that you can still see the graphs and data table in Logger Pro.

4. Play the video.
5. Enable Video Analysis by clicking on the button in the lower-right corner. This brings up a toolbar with a number of buttons (see Figure 1).
6. Click the **Set Origin** button (third from top), then click in the movie frame to set the location of the origin. If needed, this coordinate system can be rotated by dragging the yellow dot on the horizontal axis.



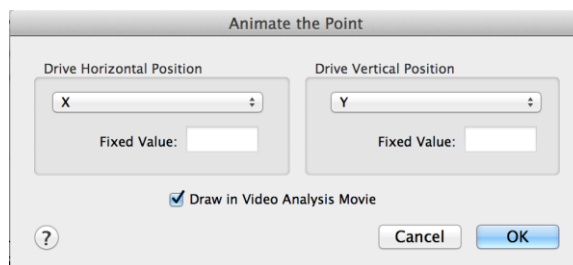
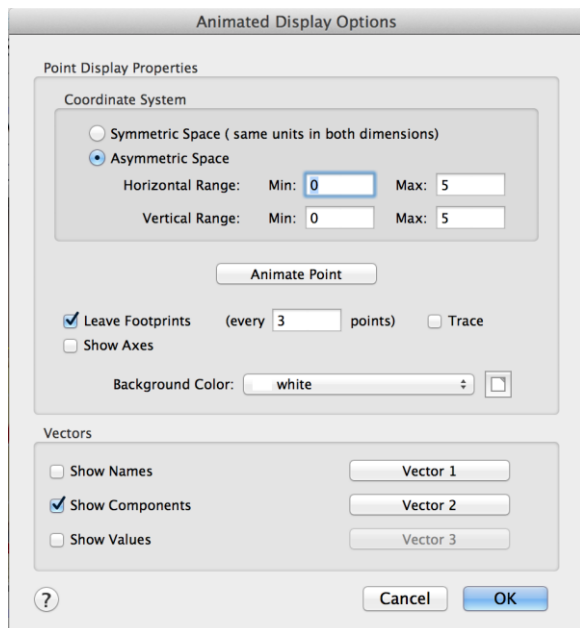
7. Click the **Set Scale** button (fourth from top), then drag across an object of known length in the movie. In this movie, the object of known length is the 2 m stick on the floor. When you release the mouse button, enter the length of the object; be sure the units are correct.
8. Use the frame advance to advance the movie clip until the object is released. Click the **Add Point** button (second from the top). Decide where on the object you will mark its location (center, top, other) and then click the object in the movie. **Important:** Be consistent in your marking. Each time you mark the object's location, the movie advances one frame. Depending on the frame rate, you may choose to mark the position every 2nd or 3rd frame. Notice that data are being plotted on the graph.
9. Continue this process as long as is desired. Should you wish to edit a point, click the **Select Point** button (top). This allows you to move or delete a mismarked point.
10. Select the graph window. Logger Pro defaults to display both the x and y positions of the object as a function of time. You should analyze the position-time behavior of each of these components separately. Perform either linear or curve fits as appropriate.
11. Similar analysis can be done of the x -velocity and y -velocity graphs.

Animated Displays

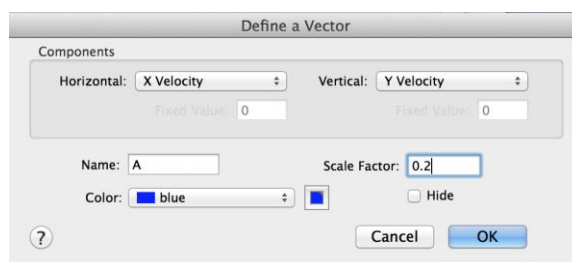
Use of the Animated Display tool in *Logger Pro* allows you to display vectors representing the velocity of the projectile at various points in its flight. If you have not used Animated Displays before, you might wish to study the example given in the file: *Exploring Animated Displays.cmbl* following the path: Experiments ► Sample Data ► Physics ► Animated Display Vectors.

To use an Animated Display for your projectile movie, choose Meter ► Animated Display from the Insert menu into your *Logger Pro* experiment file, then double-click the window to bring up the Animated Display Options window. Some sample settings are provided below.

After configuring the coordinate system, click on the [Animate Point] button and change the settings to those displayed at right.



Next, click on the [Vector 1] button and change the settings to the ones shown below.



Choosing Replay from the Analyze menu brings up the Replay control window. When the movie is played at reduced speed, one can see the points and vectors appear on the movie window during the projectile's flight.

