

## AP PHYSICS C

### Mini Guide – Vernier Video Analysis

#### How do I get started with Video Physics?

A good place to start is the basketball shot video. Tap the “plus” button and choose “Sample Videos.” Select the basketball shot video and play it. Note that the ball follows a parabolic arc, and bounces once. Also note that there is a two-meter stick on the floor, in the plane of the motion.

Now set the video to a frame where the ball has just left the shooter’s hands. If necessary, select the point marking tool. Touch the screen to move the cursor. You can touch anywhere and drag to move the cursor. Position the cursor over the ball. Tap the screen to mark a point. Two things will happen: the point is marked, and the video advances one frame.

Now move the cursor to the new position of the ball, and tap with a second finger. Repeat to follow the ball through its trajectory. If you run out of room moving the cursor, just pick up your first finger and set it down where there is room.

Next, set the scale. Tap the scale tool (double arrow) and use the cursor to locate one end of the two-meter stick. Tap to mark it, just like you marked the ball locations. Mark the other side. You’ll see a place to enter the length of the scale; in this case, enter 2 and m for two meters. This will give Video Physics the information needed to properly scale the graphs.

Touch the graph button in the upper right. You’ll see a graph of Y vs. X, which is the trajectory of the ball. Swipe to see the X and X velocity as a function of time, and again to see the corresponding Y graphs. These graphs describe the moment-by-moment position of the basket ball. Notice that the Y vs. time graph is parabolic, while the X vs. time graph is linear. Why is that? (We’ll let you answer, because we are good physics teachers and won’t do the work for you.) The Y velocity vs. time graph is linear. Is there something special about the slope of that line?

Video Physics lets you email your video and analysis to a computer, where you can open the files in Vernier’s Logger Pro software. Logger Pro has curve fitting and other tools to get more out of your work. You can also share your analyzed video to Facebook, or save it to your camera roll. In either case, the video is shown with your marked points, and the graphs are appended to the end of the video.

### **How do I mark points?**

Move the cursor by touching anywhere on the screen; you don't have to touch the cursor itself. When the cursor is in the desired position, tap anywhere on the screen. It helps to put the iPhone or iPod on a table, rather than using it hand-held.

### **I messed up. How do I fix a point marker?**

To move a marked point, just go back to that frame and repeat the mark.

### **How I do delete a marked point?**

Use the video controller to move to the desired frame. The current point will be in **yellow**. Tap it; a popup will let you delete the point, or to select all points. If you select all, you can then delete them all. Be careful; you can't get your marked points back.

### **My finger is on top of what I'm trying to mark, so I can't see it!**

You can move the cursor from anywhere on the screen. Try dragging your finger on the screen a bit to the left or right of the target cursor. You'll see that you can direct the cursor without obscuring the tracked object.

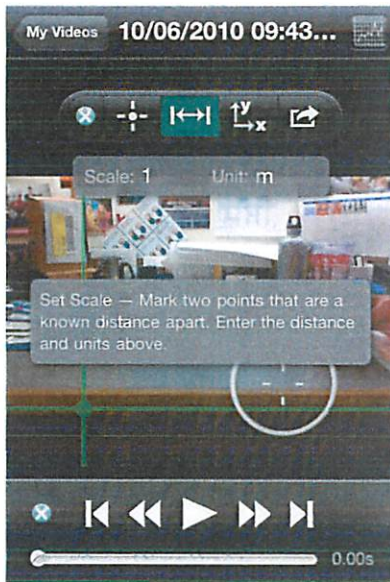
### **Can I zoom in to mark points?**

Yes! Try pinching and dragging to zoom the video and change its position. This is great for iPhone and iPod screens.

(Source: <http://www.vernier.com/products/software/video-physics/>)

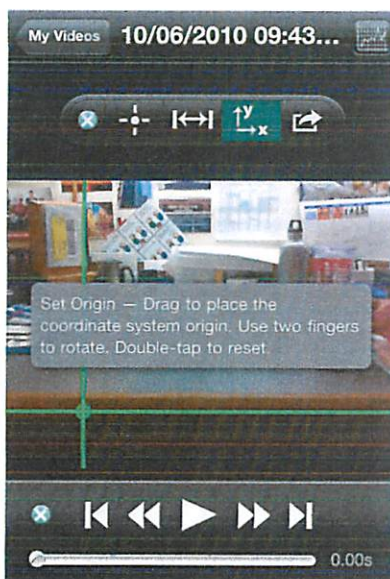
### More on Data Analysis

1. You will create your own graphs on the iPod Touch or iPad using Vernier Video Analysis.
2. First you need to set the scale.



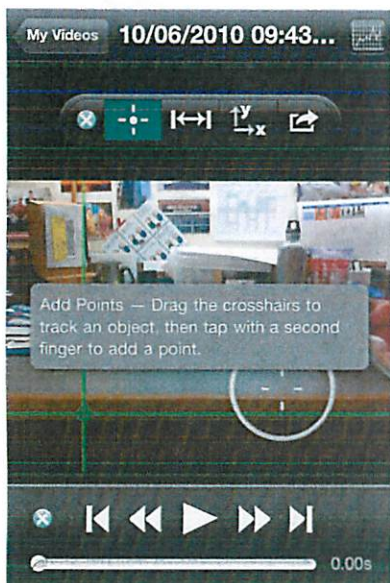
3. Put the first point at the base of the meter stick and mark the point. Then move the crosshairs to the end of the meter stick and mark the point. The scale should indicate 1.0 m. Make sure your meter stick is in the same plane as your object.

4. Second you need to mark the origin.



Drag the crosshairs to the base of the meter stick. This will be the coordinate system origin.

5. Now you need to mark your data points.



Move the crosshairs to the origin. Keep one finger on the cross hairs and tap anywhere on the screen to add a second point.

6. A blue dot will appear and the video will advance to the next frame. Move the crosshairs to the location of the soccer ball.

7. Keep one finger on the crosshairs and tap anywhere else on the screen to add a second point.

8. Repeat this process until the soccer ball no longer appears in the field of view.

9. You can export your data/graphs/video to your email or to your camera roll. If you send it to your email, you can then open the data file up in Logger Pro to do more substantial data analysis.