**Station 1: Free Fall**

**B. Analyzing the movie**

1. Open All Programs/Vernier Software/LoggerPro 3.8.2. From the top toolbar, select Insert/Movie. From the dialog box, open "Desktop" and select your file (DSCNOO\*\*).The first frame of your movie will be displayed.
2. Play the movie by clicking on the arrow at the bottom left side of the movie►. Go back frame by frame using the double arrows to the first frame where the ball is in motion.



1. Click on the right-bottom arrow to enable the video analysis. From the vertical toolbar, click on to scale the movie. On the screen, click on the bottom end of the meter stick and drag to the top end. In the dialog box, enter the length of the meter stick (in meters).



1. You are now ready to analyze the movie. From the vertical toolbar, click on icon select your pointer. Click on the ball in the first frame where the ball is moving. The movie will advance by one frame. Click on the ball on each frame, until the last frame of the movie.



1. Click on the icon again to de-activate your pointer. Minimize the movie, so you could see the graphs.



1. Click on the y axis label and select "y" from the pop-up menu. The graph of the vertical position will be displayed. What is the shape of the graph? Describe the motion in the vertical direction.l
2. Click on the graph and drag to select the data points. Click on the curve fit button , the select the first appropriate fit. What kind of curve fit best matched the graph? Write the equation (with the parameter values). Snip and paste the graph into OneNote.



1. Click on the y-axis label and select "y velocity". The graph of the vertical velocity will be displayed. What is the shape of the graph? Describe what the velocity does over time.
2. Click and drag on the graph to select the data points and then try a linear fit . What is physical significance of the slope of this graph? Write the slope value below. Snip and paste the graph into OneNote.



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1. Explain why there is a portion of positive velocity and then negative velocity on the graph.
2. Is there a point where the vertical velocity is zero? Where is this point? Is the acceleration zero at this point? Do these results match your prediction in the Preliminary Question?
3. Is there a relationship between the slope of the y-velocity graph (question 9) and the parameter ***a*** from the y graph (question 7)? Why?
4. Using the Vy versus time graph, find the acceleration in the y direction. Explain the significance of the portion with negative Vy. Where did the ball slow down, and where did it speed up?
5. Is the acceleration zero at the top of the path?
6. Did you prove that the acceleration is constant? How does your data support this affirmation?
7. Do your experimental results match your predictions in the Preliminary Questions?
8. The acceleration due to gravity has a magnitude of 9.8 m/s2. How does this value compare to the acceleration calculated in question 9 above? Calculate the % error between these values and list several possible reasons.