

Name \_\_\_\_\_  
SI Physics  
Period \_\_\_\_\_

Date \_\_\_\_\_  
Lab #8H (35 pts)  
Mrs. Nadworny

Partners:

Due Date \_\_\_\_\_

## Video Analysis of Free Fall

**NO Lab Write-Up Required**

**Purpose** To determine the acceleration due to gravity

**Research Question** What is the relationship between the vertical distance a ball travels and the time taken to travel this distance?

### Procedure

1. Go to <https://videoanalysis.app/>. Enter the KEY: \_\_\_\_\_
2. Scroll down to find the video of the Ball Drop under Sample Videos and click on that.
3. Play the video once or twice to see the basketball dropped from the top of the building then slide the video back to the beginning. Set up a frame of reference and a scale to make measurements. Choose the System/Origin tool from the left toolbar. Drag the origin to the center of the basketball. You can pinch the screen with two fingers to zoom in which will make marking up the video much easier. Additionally, you can use two fingers to drag the screen so you can move around within the video.
4. Next, choose the System/Scale tool from the left toolbar. Drag both ends of the line with circles on the ends down to the meter stick shown. If you can't see the line with circles or the meterstick, you may have to zoom out and in to find them. [The meter stick is a little vertical yellow line on top of the first floor window.] Put the end circles on each end of the meter stick. Zooming in will help you place the circles accurately.
5. Now you're ready to start putting dots on the video. Use the Add tool to move the crosshairs to the center of the basketball and click. [If you can't see the crosshairs, zoom back out to find them.] This should place a blue dot on the frame and a data point in the table and on the graph. This is your data. Continue to place dots on the basketball in the video as it advances frame by frame until it has hit the ground.

*(Pro tip: Click the Gear icon and choose to advance by more than 1 frame per click, perhaps 5 frames, if it's too tedious.)*

*(Pro tip: If you need to delete a point, choose the Edit tool, click on the point so it turns white and then either Backspace or drag it to the magically appearing trash can.)*

*(Pro tip: Choose the User Manual from the three dots in the upper right corner for more help if needed.)*

6. At this point you should have one complete set of dots on the video and one complete graph. [You will see two graphs (X and Y) but you can hide the X (horizontal) graph by clicking on the vertical axis label and toggling off the X graph.]

7. Now you are to find the best fit curve shape that will help you determine what this relationship is. Use the Graph Tools/Apply Curve Fit tool from the bottom left corner of the graph to find an appropriate best fit shape.

8. In the space below, make a claim in a complete sentence to answer the research question. (For example: The relationship between ... and ... is ...)

Claim: (1 pt)

9. In the space below, give some evidence to support your claim, in one or more complete sentences. (For example: The relationship is ... because a ... can be drawn through/near all/most of the data points.)

Evidence: (2 pts)

10. In the space below, use the statistics box that popped up with the best fit curve to write the equation of the relationship. Be sure to use appropriate units.

Equation: (2 pts)

11. Use the equation you wrote above and an appropriate math model to find an experimental value for the acceleration of gravity. Show your work below including the math model you used. (5 pts)

12. Take a screenshot of your desktop showing the video with the dots on it, the graph with the best fit curve and equation, and the data table. Be sure the numbers in the statistics box that you used to write your equation can be seen clearly. Put this screenshot into a Google Doc, name it *lastname\_firstname\_freefall*, and share it with me via Google Drive. (25 pts)