

TRAJECTORY LAB (Rev 11/11)

Purpose: To analyze the trajectory of a ball following a two-dimensional arc and to verify the independence of the horizontal and vertical components of motion.

1. Open LoggerPro 3.8. Then:
 - a. Select "File", "Open", "Experiments", "Sample Movies", "Basketball Shot".
 - b. View the movie (play and/or slide buttons). Position ball to its first position after it leaves the shooter's hand.
 - c. Position the origin onto the first ball position using 3rd button on right ("Set Origin").
 - d. Set scale (2 meters) of movie using 4th button on right ("Set Scale") and 2 m stick in the movie. Click and drag according to instructions in the window.
 - e. Take data using 2nd button on right ("Add Point"). Once button is selected:
 - (1) Place cursor on first ball position (origin) and click mouse. Basketball advances to next position.
 - (2) Place cursor on new ball position and click mouse.
 - (3) Continue process until all visible ball positions have been marked up to the point where the basketball bounces on the floor; note how data table is automatically filled out.
2. Open a new Excel spreadsheet. Select all the data in your LoggerPro data table and copy it to your Excel spreadsheet.
3. Create ~~4~~ graphs in Excel:
 - a. Horizontal distance (m) vs. time (sec).
 - b. Horizontal velocity (m/s) vs. time (sec) *For this graph set the vertical axis values by right clicking on the vertical axis and selecting "fixed" for the maximum value enter 10 and for the minimum value enter 0*
 - c. Vertical distance (m) vs. time *Put in a polynomial trend line*
 - d. Vertical velocity (m/s) vs. time (sec)
 - e. Label the graphs properly and create a best-fit line displaying the equation.
4. Write a paragraph (insert text box) describing:
 - a. what each graph is showing, and what the slope of graphs a, c & d represents. For graph b, describe what the equation of the trend line is representing.
 - b. a comparison (%error) of the slope of your vertical velocity vs. time graph to the actual value. *(Hint: What plug variables in to the slope formula to determine what it is representing)*
 - c. the shape of the trajectory followed by the basketball and explain why (which FAB 5 equation)
 - d. how these results demonstrate the independence of horizontal and vertical components of motion.
5. Save the Excel file to your H: drive using your name and the word trajectory, for example "JenkinsTrajectory", then close. Go to your H: drive and click and drag the file to your teacher's file on the R drive (drop box) for the applicable hour.