VIDEO ANALYSIS OF MOTION USING LOGGERPRO 3.3

Part A. Predictions

1. Two players stand facing each other at a distance of 4 meters. Person A passes a basketball to person B and you observed that the ball travels a parabolic path. Use a sheet of size 1 paper to write your predictions.

    a) Sketch the graph of the horizontal position of the ball as a function of time (x versus t graph) and the vertical position of the ball as a function of time(y versus t graph).

    b) Which of the graphs will show a linear relationship? Quadratic relationship?

Part B. Setting Up

1. Open ***Logger Pro 3.3***.

2. Pull down the ***Insert*** menu and choose ***Movie***. Look for the movie file that was saved in the desktop. Click and drag on one corner of the video to resize it. Move the video to the left side by dragging the sides of video player.

3. A graph is also displayed on the window. Move and resize the graph so that it is located to the right of the video player.

4. Click on the ***Enable/Disable Video Analysis*** button. This is the rightmost button at the bottom of the graph. By default, the graph will display both the x and y positions versus time. For this activity, you will analyze both the x and y positions, or the horizontal and vertical positions. The y-axis should show "X" and “Y”. On the other hand, the x-axis on the graph should display “Time (s)”

5. **Setting the Scale.** When the video was made, a meter stick (or a ruler) was placed on the background. Click the ***Set Scale*** button, which is the fourth button from the top on the right side of the movie player. Now click and drag the mouse from one end of the meter stick to the other end. A pop-up dialogue box will appear. If the default of "1" for the Distance and "m" for the unit of measure is correct, click OK, otherwise, change the values on the dialogue box.

6. To synchronize the movie with your data, you need a recognizable event seen on the movie and on the graph. Click the ***Play*** button, and just before the person releases the ball, click the ***Stop*** button. Next, click the ***Next Frame*** button and advance the movie until the ball has just left the person’s hands.

7. Click the ***Add Point*** button (second from the top). Move your mouse over the movie and use the cross hairs to identify the midpoint of the ball. Click the mouse once. Notice that a mark is left on the screen, and the movie advances one frame. Mark the midpoint of the ball again and repeat this process until the ball has reached the other person’s hands.

Part C. Analysis

1. Analyze the motion along the x-axis by examining the displacements along the horizontal axis. Is the distance between the two adjacent points increasing, decreasing, or approximately equal? Is the motion along the x-axis constant, or constantly changing?

2. Analyze the motion along the y-axis by examining the displacements along the vertical axis. Is the distance between the two adjacent points increasing, decreasing, or approximately equal *when the ball is going up* until it reached its highest point? Is the motion along the y-axis constant, or constantly changing?

3. Analyze the motion along the y-axis by examining the displacements along the vertical axis. Is the distance between the two adjacent points increasing, decreasing, or approximately equal *when the ball is going down?* Is the motion along the y-axis constant, or constantly changing?

4. Select the x versus t graph. Describe the shape of the curve. What type of relationship does the x vs t curve show? Does the curve show a constant velocity, or a constantly changing velocity?

   If there is a linear relationship between x and t, then use the linear fit button to determine the velocity if the projectile along the x-axis. What is the value of the velocity?

5. Select the y versus t graph. Describe the shape of the curve. What type of relationship does the y vs t curve show? Does the curve show a constant velocity, or a constantly changing velocity?

   If the relationship between y and t is not linear, then use the curve fit button to determine the equation of the line. Does the equation show constant acceleration? What is acceleration of the projectile? What is its initial velocity?

6. Sketch the graph of x versus t and y versus t as observed in the video analysis. Compare them to your predictions. Write the mathematical relationships for each graph.

7. Based on your values of the initial horizontal and initial vertical velocity of the basketball, compute the initial velocity and projection angle of the basketball.

8. Copy the graphs in a word file and save them on your flash drive. Submit your preliminary data to your teacher. Once the paper is returned to you, prepare an informal lab report.