Pivot Interactives Playground Ball Projectile Motion

Purpose: To analyze motion in two dimensions in a gravitational field.

Access the Pivot Interactives lab "Three Views of Projectile Ball". For this lesson we will be using the video and measurement tools, but we will be using an Excel spreadsheet for the analysis.

The video begins like this:

In the side view, you can watch the flight of the playground ball from the usual perspective. But we will use the top view to analyze the horizontal motion of the ball and the front view to analyze the vertical motion.

Run the video through once. You will see the familiar parabolic path in the side view. The top view and front view are something else altogether.

Now open the toolbox in the upper right hand corner of the screen. Click on the stopwatch, the vertical ruler and the horizontal ruler.

Return to the beginning of the video and advance the video frame by frame until the moment when the ball leaves hands of the thrower. Now do three things. First, RESET the stopwatch so your measurement starts at 0.000 seconds. Second, move the horizontal ruler over the top view so that the ball has position zero at this moment. Third, move the vertical ruler over the side view so that the ball has position zero in this view as well.

In a spreadsheet, tabulate the time, the horizontal position and the vertical position as columns. Your first entry will be time 0.000 seconds, horizontal position 0.000 m and vertical

position 0.000 m. Then advance the video five frames and enter the time, and horizontal and vertical positions again.

1) Plot the horizontal position vs. time, and fit a linear trendline. Print the equation in the plot. Does it adequately describe the data? What is the horizontal velocity of the ball in the video?

2) Plot the vertical position vs. time, and fit a polynomial trendline. Print the equation in the plot. What is the initial vertical velocity of the ball? What is the vertical acceleration of the ball? What is the vertical velocity of the ball at the end of your analysis?

Put screen shots of your two plots and the answers to these questions in a Word document and submit it via Canvas.