Object Launched Horizontally

- In this video, a ball rolls off a table and follows a parabolic trajectory toward the floor.

- Both horizontal (x) and vertical (y) position values are useful in this two-dimensional motion and their respective graphs should be compared to each other.

- After the video frames have been marked and the data copied into a spreadsheet, you should use both the vertically and horizontally placed meter sticks to scale your data.

- The origin may be moved to any convenient place.

- A plot of the ball's vertical (y) vs horizontal (x) positions will result in the trajectory of the ball.

- A graph of the ball's horizontal position vs time should be linear with a slope equal to the ball's horizontal velocity during the entire movie clip.

- A graph of the ball's vertical position vs time should be parabolic, indicating that the ball was accelerating vertically as it fell. The coefficient of the equation's square term should be approximately ±4.9, its sign dependent upon the prior data translations.

- Through this analysis, students should become aware that gravity only affects the vertical motion of an object in flight.

- Manipulations of the vertical and horizontal components of the motion can yield velocity and acceleration values. The horizontal velocity should remain constant and the horizontal acceleration should be zero. The vertical velocity should indicate an increase in the ball's vertical speed, and yield a constant vertical acceleration of ±9.8 m/s/s.

- Students can apply the Pythagorean Theorem to the horizontal and vertical velocity values to calculate the ball's speed at any time/position of its flight.