How High Will It Go?

Purpose: To compare the height from which a golf ball is dropped with the height to which it bounces after hitting a hard surface.

Materials: Golf ball, brick or block wall, meterstick, chalk

Procedure: (Groups will be of two or three students.)

1. *The experiment should be done near a brick or cinder block wall, or near the chalkboard in the chemistry and physics lab so that the distances can be measured. Using a meterstick and chalk, mark off some convenient units. You will need to drop the ball a few time to judge for yourself what distances to mark off with chalk.*
2. *Divide the activities so that one student drops the ball, one student watches the bounce and measures the bounce height, and one student records. (In groups of two, adjustments must be made.)*
3. *Drop the ball from various predetermined heights. The height to which the ball bounces must be measured as carefully as possible. Both the height of the drop and the height of the bounce should be recorded.*
4. *Drop the ball at least two times from each height with the average of the bounce heights used as the final measurement. If there is too much variation in these measurements, take a third measurement.*
5. *Drop the ball from at least six different heights, beginning at the lowest one and increasing the height a regular interval, until six different heights have been measured.*
6. *Care must be taken in making the measurements. Drop the ball from the marked line, using the same point on the ball (either the top or bottom) when judging the drop and bounce heights.*

Data Analysis:

7. *Prepare a graph of bounce height as a function of drop height. (Follow all the graphing rules we studied in chemistry class.)*
8. *Draw a best fit line for the data points. Remember this is not a dot-to-dot line. It is a line which shows the relationship involved.*
9. *Compute the slope of the best fit line. Show your calculations for the computation. Note: This is not the slope between the first and last data point.*
10. *Write the equation for the line using the slope-intercept form ($y = mx + b$) Will "b" necessarily be zero? Why?*
11. *Use the graph to predict the height of the bounce for a ball dropped from a point which is halfway between two data points. This use of a graph is called interpolation.*
12. *Test your prediction by comparing with the actual bounce height.*
13. *Use your graph to predict the height of a bounce for a ball dropped from a distance higher than your highest data point. This use is call extrapolation.*
14. *Test your prediction by performing the drop and comparing with the actual bounce height.*
15. *What can you conclude about the accuracy of information found from a graph by interpolating between data points and extrapolating beyond them?*

Data and Calculations Sheet

Data Chart A	*Drop Height*	*Bounce Height*	*Bounce Height*	*Bounce Height*	*Ave. of Bounce Height*
Trial 1					
Trial 2					
Trial 3					
Trial 4					
Trial 5					
Trial 6					

Data Chart B	*Prediction*	*Test Results*	*Difference*
Value between data points ( )			
Value beyond data points ( )			

Slope Calculations:

Equation for the line:

Name:

Lab Partners: