

author:  
team members:  
date:

## Nonlinear Slingshot Lab

**Purpose:** Tell the objective of the activity. Briefly explain what you will do in the following sections and why.

### Work Function for the Slingshot

Apparatus: Make a neat sketch of your slingshot design showing key dimensions and defining the variables.

Procedure: Briefly explain how you measured  $F$  vs  $x$

Data and Analysis: Include your graph of  $F$  vs.  $x$  and state the empirical relationship you found (polynomial fit).

Conclusions: Work vs  $x$ : Show how you derived  $W(x)$  step-by-step (AP standards).

### Initial Velocity and Slingshot Displacement

Apparatus: Make a neat sketch of the test platform including table, ramp, slingshot, and tray. Show key dimensions and variables.

Analysis: Derive a formula for  $v_0^2$  as a function of distance to the tray, height of the table, and angle of the ramp. Then use the work-energy theorem,  $W(x)$ , and your measurements to find the amount  $x$  to pull back the slingshot. Show your work step-by-step, AP standards.

### Test results

Tell the predicted distance, actual distance, and %error:  $(\text{predicted} - \text{actual})/\text{actual}$

**Conclusions:** Discuss the likely sources of error

Technical Writing (part of the score)

This is your first mastery assignment and will go in your lab portfolio. Please produce a high quality product that you would be happy to show to a college representative evaluating your work. Word processing is required. Write in sentences and paragraphs, not bullets. The sketches may be done by hand and scanned in as an image or done with draw tools. Good technical writing is clear and concise, no longer than needed to convey the necessary information.

Each person must produce their own report, even though your data is the same in each group. AVOID PLAGERISM!! DO NOT cut and paste text or equations or give another student your report as a “starting point”.