CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)

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Project Number

S0204

Project Title

Shooting for Distance

Abstract

Objectives/Goals

The objective of our project was to find the optimal weight for maximum distance at 100 PSI. We would fire water bottle projectiles out of a pneumatic cannon at different weights and try to find the farthest distance.

Methods/Materials

A pneumatic cannon was filled up to 100 PSI with an air compressor, and a projectile, a water bottle, was filled with birdshot between 99g and 3157g. The cannon was then loaded and fired, and the distance was measured and recorded. This distance was plotted on a scatter plot and fitted to a graph to determine the optimal weight to distance ratio for a projectile.

Results

The results of our projectile fit very closely to our hypothesis. There was a sharp increase in distance as the weight was increased until a certain point, around 1300 grams, after which point the distance steadily decreased.

Conclusions/Discussion

As said before we did not quite get a perfect model of what we thought would happen, however still proved our hypothesis. Our original expectations were that it would look similar to a parabola with a fairly sharp increase and a fairly sharp decrease. While it was evident based on our tests that the sharp increase was realistic, the fluctuation with what we projected was in regards to the decrease of the function. In order to have fully witnessed the relation between weight and distance we would have had to use much larger projectiles with a larger mass. Even though we had a three person group for our project, there was constant work to be done by all three members of the group, whether it be taping water bottles, refilling the chamber with air, or measuring and recording data. Another thing that we would change if we were to do the experiment again would be to let the glue set longer on all the joints and around the valve. This alleviates several issues, first the possibility of air leaking out from the joints, and second the issue of pressure exploding the reservoir. One of our endcaps blew up and caused substantial damage to the wall of the house and broke a window because we did not let the glue set for long enough.

Summary Statement

Our project is about trying to find the greatest distance a water bottle can be shot using a pneumatic cannon.

Help Received

Chemistry and phsyics teacher helped with formulas