CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
Reed B. Benoit

Project Number
J0202

Project Title
The Trebuchet: A Study of Mechanics and Motion

Abstract

Objectives/Goals
My project was to evaluate how different sling lengths and counterweight masses affect the distance a trebuchet throws a ball. My hypothesis was that a trebuchet would shoot farther with a medium sling length and a medium counterweight.

Methods/Materials
Initially, I built a 6' trebuchet. My manipulated variables were the length of the sling and the mass of the counterweight. I used 4 different sling lengths: 36", 33", 30" and 27". I used three counterweights: a 4"x12" PVC pipe filled to the top with sand, filled half-way and empty. I tested each counterweight with each sling length 5 times. I then averaged the 5 trials to obtain a distance measure.

Results
I discovered that with a full counterweight and a 27" sling length the trebuchet shot the farthest. In other words, the heaviest counterweight with the shortest sling worked the best.

Conclusions/Discussion
My results did not support my hypothesis. After I did my testing, I learned that the counterweight was the principle energy for firing the projectile. The heavier the weight the more force it had, the farther the ball flew. I also learned that the distance between the fulcrum and the counterweight and also the sling length were important. The shorter the distance, the faster and farther the ball flew as well.

Summary Statement
I built a trebuchet to evaluate how different sling lengths and counterweight masses affect the distance a trebuchet throws a tennis ball.

Help Received
Help with background research: Professor Monty Mola at Humboldt State University, librarian at HSU. Help with trebuchet construction: my dad and uncle. Help with backboard and writing: my mother