CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
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Project Number
J0222

Project Title
The Trebuchet Weight vs. Distance Test

Abstract

Objectives/Goals
Hypothesis: The more massive the counterweight, the further the projectile travels. The more potential energy stored in the counterweight, the more kinetic energy the projectile will have. The energy comes from gravity's pull on the counterweight, and is transferred to the momentum of the projectile.

Methods/Materials
Methods/Procedures:
1) Construct trebuchet
2) Load 16 oz. counterweight
3) Add 1 oz. into counterweight
4) Hook pouch's string onto nail; Set the pin; Straighten string; Center the counterweight; Pull pin
5) Measure distance projectile is thrown; Record distance
6) Reload and repeat steps 3-5 until you're out of weights
7) Graph results
Materials:1 can, 1 16oz. weight, 20 1oz. weights, Trebuchet (9 pieces of wood, 11 screws, Wire, Wood base, Nail for hook, Nail for pin), 1 pouch, 1 large marble, 22 in. of string, Tape measure

Results
The trebuchet threw the projectiles further the more weight there was. The last projectile didn't travel as far as the 2 projectiles before it. But the measurements kept at an increasing rate. The average increase was 10.49 cm.

Conclusions/Discussion
The test was to see how the mass of a counterweight would affect the throwing distance of a trebuchet. I thought the heavier the counterweight the further the projectile would travel. We launched 20 projectiles, increasing the counterweight#s mass each time. The data showed that as I put more weight into the counterweight, the projectile flew further. However, the final projectile didn#t go as far as it did during the two previous launches, but the decrease was one out of twenty data points. The decrease happened because the counterweight put too much friction on the pivot and slowed the arm down, and caused the arm and pivot to wobble, adding to the friction. My hypothesis was supported despite the last data point.

Summary Statement
I'm trying to see how a counterweight affects a trebuchet's throwing distance.

Help Received
Grandfather designed a trebuchet I could put together; Father helped with the science; Mother helped organize the project.