Name(s)	Project Number
Charles R. Wulke	**J0233**

Project Title

The Effects of Newton's Laws of Motion on an Ancient Weapon, the Trebuchet

Abstract

Objectives/Goals

The objective of this project is to see how the distance a projectile is thrown by a trebuchet (an ancient catapult)is affected; (1) by increasing weight to the counterweight, and (2) by adding wheels to the trebuchet platform.

Methods/Materials

I made a scale model trebuchet. I then made a series of firings of the trebuchet with different weights as counterweights, first with the platform held stationary, and then with the platform free to move on wheels. I analyzed the results in light of Newton's three laws of motion, and formulated my conclusions / explanations.

Results

I discovered that increases in the counterweight resulted in increases in distances that the projectile was thrown. Furthermore, when the platform was allowed to move during the firing, the distance the projectile was thrown increased still more, although not always in a manner I would have predicted.

Conclusions/Discussion

By increasing the counterweight on the pendulum arm, and permitting the platform to move during the act of firing a projectile, the arc of the falling counterweight, in a free-swinging weight basket, is lengthened when compared to the arc of the end of the weighted pendulum arm. This increase in distance the weight falls, by the actions of Newton's Second and Third Laws of Motion, results in an increase in the force applied to the "free" end of the pendulum and the projectile is thrown farther.

Summary Statement

In studying and observing how a trebuchet operates, I learned the relationships between Newton's Law of Motion, and how this ancient weapon generated such awesome power.

Help Received

My family supported me in this project by helping: to build the model; edit the report; and, advise on the arrangement of the display board.