CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Josephine Wong

Project Number
S0321

Project Title
Power of the Waterwheel

Abstract

Objectives/Goals
The objective is to develop a formula that relates the number of blades to the time it takes my waterwheel to lift a 16.4-gram object thirty-five inches.

Methods/Materials
I conducted three experiments. In Experiment #1, I used a three-bladed waterwheel, a six-bladed waterwheel, and a twelve-bladed waterwheel and controlled the weight at 1030.156 grams. In Experiment #2, I changed the weight of the waterwheel to 1030.156 grams, 1127.486 grams, and 1226.816 grams and controlled the number of blades at twelve. In Experiment #3, I used a 12-bladed waterwheel weighing 1030.156 grams, a 6-bladed waterwheel weighing 923.366 grams, and a 3-bladed waterwheel weighing 869.946 grams. I conducted five trials for each waterwheel. In each, I measured the number of seconds it took the waterwheel to lift the 16.4-gram object. I used the results from Experiments #1 and #2 to write my formula and the results from Experiment #3 to check whether my formula was correct.

Results
In Experiment #3, the twelve-bladed waterwheel took 13:27, the six-bladed waterwheel took 13:94, and the three-bladed waterwheel took 16:62 to lift the 16.4-gram object.

Conclusions/Discussion
These data results show that my hypothesis - when the number of blades is doubled, the time it takes waterwheel to lift the 16.4-gram object will decrease by 20% - was incorrect. The time actually decreases exponentially according to: y = 23.01 x 0.9501^x, where x is the number of blades and y is the time elapsed in seconds. In the future, I plan to experiment how blade designs affect a waterwheel's efficiency.

Summary Statement
My project focuses on how the number of blades affects the time it takes the waterwheel to lift a 16.4-gram object thirty-five inches.

Help Received
Father helped me buy the materials needed to build the waterhwheel.