# CALIFORNIA STATE SCIENCE FAIR
# 2002 PROJECT SUMMARY

**Name(s)**
Jennifer J. Wan

**Project Number**
22530

**Project Title**
## Gone with the Wind

**Abstract**

**Objectives/Goals**
My goal in this experiment was to determine the effects of blade size, angle of positioning, and direction of wind on a windmill. In this experiment I believed that the propeller with a large blade, placed at 45 degrees would be the most efficient - efficient in the sense that it was able to complete the most amount of turns within the given time and that it pulled up the constant weight in the shortest amount of time.

**Methods/Materials**
In this experiment I first drew a template which I kept proportionally the same for all three blade sizes - large, medium, and small. I then created different angles in which the blades were inserted in the propeller - at either 30, 45, or 60 degree placements. I created a shaft and base in which the propeller went into. The testing required the fan to be placed 15 inches away and at level height with the propeller. I first counted the number of revolutions completed within 10 seconds. Then I moved it farther at 33 inches to see the effects then. The third portion of the experiment was where I timed to see how long it took for each propeller to pull up a specified wieght. Then finally I altered the angle at which the wind source was directed at the propeller - to be either headlong or at a 45 degree angle.

**Results**
From my experiment, I found that the propeller with the small blade, placed at a 30 degree angle, overall performed the best. Althought it did not indivdually work the best for each section of the experiment, it did constantly perform at a high rate for each test. The large blades continuously performed the slowest out of all three blade sizes. When the direction of the wind was position directly in front of the propeller, the propeller worked better - as apposed to being directed from an angle.

**Conclusions/Discussion**
Thus from the experiment, I have found that the smaller blade worked the best as well as the smaller angle. My hypothesis was wrong, but could have been so from a number of reasons. The large blades could have been affected by friction and resistance, or it the weight could have been a factor. The smaller blades most likely were the fastest most likely because of its lighter weight. Also, from this experiment it is determined that wind should be direct with the propeller, thus the need for windmills to be able to freely move with the wind, to be the most efficient.

**Summary Statement**
This project is about the effects of the size of a blade, the angle of positioning of the blade, and the direction of wind source on a windmill.

**Help Received**
Dad helped cut wood and nail together and saw.

Preliminary