



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Chelsea B. Green	Project Number 22724
Project Title The Effects of Blade Size and Shape on the Electrical Output of a Generator	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine what effects windmill blade size, shape and angle placement has on the generation of electrical energy. I hypothesized that the small trapezoidal blade would be the best energy producer.</p> <p>Methods/Materials Materials: One windmill-wooden base with triangular shaped sides, One Amp Meter, One Fan, One Tape Measure, One Electrical Motor, 24 Square Blades(3 sizes), 24 Rectangular Blades(3 sizes), 24 Trapezoidal Blades(3 sizes)& 24 Triangular Blades(3 sizes).</p> <p>Experimentation Methods:</p> <ol style="list-style-type: none">a) Build the windmillb) Attach the motor & amp meter to the windmillc) Cut out 96 blades(4 shapes-3 sizes for each shape)d) Place the fan one meter from the blades of the windmille) Set the angle of the blades on the windmill hub to 75 degreesf) Turn the fan on mediumg) Read the voltmeter and record the amount of electricity producedh) Repeat steps D-G using the different sizes and shapes of bladesi) Repeat steps D-G but setting the angle on the windmill hub to 45 degrees and 60 degreesj) Use the recorded data to prepare graphs to display results <p>Results I observed that the smaller, lightweight blades placed at a 45 degree angle produced more energy. Blades placed at a 75 degree angle consistently produced less energy.</p> <p>Conclusions/Discussion In conclusion, I found my original hypothesis to be incorrect in that the Square and Rectangular shaped blades were more efficient energy producers rather than the trapezoid that I had originally theorized. Of the four shaped blades, the Triangle was the lowest producer followed by the Trapezoid. The Square and Rectangle were higher producers and had very similar test results. My final results show that the small Square and Rectangular shaped blades placed at a 45 degree angle were the most efficient producers of electrical energy.</p>	
Summary Statement My project is about measuring electrical output when using various sizes, shapes and angle placement of windmill blades.	
Help Received Father-Collected/organized materials & assisted with testing. Wilson Wang-Assisted in buiding windmill. Kevin Sill-Technical advisor/assisted with testing. Antone Natale-Provided motor. Christine Voe-Cut out blades. Vanessa-Cut out blades. Mother-Assisted in collecting data, reports & display board.	