



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Daniel (D.J.) R. Freeman, Jr.	Project Number 29141
Project Title The Power of the Wave: Which Area in a Wave's Development Will Yield the Most Energy?	
Objectives/Goals Abstract The purpose of my project was to determine what section of a wave will produce the most electrical energy. The reason I did this project is to see if wave power is a credible source of renewable energy. If so, than what phase should we look to? My hypothesis was that the breaking wave would produce the most energy. The reason behind my hypothesis is that I knew a breaking wave is incredibly strong. I chose this project because our source of electrical power is diminishing and due to our heavy use we will soon run out. This renewable energy will provide an alternative source of power for homes and businesses around the world. Methods/Materials For this project I built my own wave tank. I also built my own wave energy apparatus with an aluminum pie pan, wooden dowels, nylon spacers, fishing wire, and two half ounce metal washers. The tank consisted of a 4ft long, 1ft wide, and 1.6 deep glass aquarium with pieces of Plexiglas and dowel holders glued with industrial strength adhesive. I created a wave by pushing a Plexiglas paddle with the relatively same amount of strength and counted by thousands to make sure the movement was even. This process was repeated five times and the movement was repeated until the washer completely wound around the dowel. This was repeated for three different wave locations. The locations were swell, breaking, and whitewater. Results The overall results for the least amount of winds it took for the weights to reach the top of the dowel was the swell wave with 20 movements. The next lowest amount of winds was the breaking wave with 28.5 movements. The highest amount of winds came with the whitewater wave and took 35.5 movements. Conclusions/Discussion After completing my investigation I found out that my hypothesis was incorrect. I thought that the breaking wave would create the most energy, but the undertow kept turning the waterwheel in the opposite direction. The swell proved to be the best method of capturing a waves energy because it was the most consistent. The whitewater was absolutely impractical because the undertow was too strong. I learned from my experiment that the swell period is the best place to extract from a wave. In further projects, in order to collect renewable energy it should be set in the open ocean where swells are at their most potential. I did prove that the swell wave could be used as a source of renewable energy, thus providing power for our world.	
Summary Statement The pupose of my project is to prove which area of a wave's development will yield the most energy.	
Help Received Mother and Father, supervised; Mr. Carl Gong coached; Precision Plastics cut materials for wave tank.	