



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Archer Defterios	Project Number J0306
Project Title World's Strongest Shape	
Abstract Objectives/Goals My goal for this project was to test the strength of three angular shapes - triangles, squares and rectangles. I had read that triangles are the strongest shape and I was curious to see this tested in three dimensions. Testing the strength of shapes is important, especially for construction in poorer areas, because using stronger shapes can make buildings sturdier and safer, and may even save costs. My question was - which foundation shape can hold the most weight; one made out of popsicle stick triangles, squares, or rectangles? My hypothesis was - if I test how much weight each popsicle stick foundation will hold, then the foundation made out of triangles will hold the most weight. Methods/Materials I glued together foundations made out of popsicle stick triangles, squares and rectangles. I place books on top of each foundation until the structure started to break or did break. I did this three times and found the average amount of weight held by each structure. Results The triangle structure held the most weight, an average of 55.2 kilograms. This was almost five times as much as the rectangle structure, which held an average of 11.3 kilograms, and 16% more than the square structure, which held an average of 47.6 kilograms. Conclusions/Discussion My hypothesis was correct, the foundation made out of triangles held the most weight. Therefore, triangles are the strongest shape. This idea is supported by research and real uses of triangles in construction and design. I learned that triangles are the most rigid shape because forces on a triangle are distributed evenly along its three sides. The pushing force on a triangle's top two sides balances the pulling force on the triangle's bottom side. Unlike a rectangle, a triangle will not change shape when the length of its sides are fixed. A steel rectangle may be stronger than a wooden triangle, but if only wood is available - using a triangle will add stability to a structure. I believe triangles will solve more building and design problems in the future. Maybe triangles will make a difference in low-income housing or building in earthquake zones. Maybe triangles will be used to design a record-high skyscraper or a new invention.	
Summary Statement This project tested the strength of three angular shapes; triangles, squares and rectangles, by testing how much weight popsicle foundations made out of each shape held.	
Help Received Mother helped (1) take photos during testing, (2) do some typing, (3) find some research.	