CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Elizabeth J. Kennedy

Project Number
J0211

Project Title
What Bridge Design Is Strongest?

Abstract

Objectives/Goals
My project determines which bridge design, Warren, Pratt or K, would be the strongest. I think the warren-truss design will be the strongest because it is the simplest design and spreads the weight of the load evenly over the bridge.

Methods/Materials
Popsicle sticks and glue were used to build 3 different bridge designs: Pratt truss, Warren truss, and K truss. 5 identical models of each design were built. All 15 bridge were the same length. Each bridge was then tested to the breaking point. These tests were done by placing the bridge between 2 bricks, a bucket was placed on the bridge and I slowly added weights, one pound at a time, until the bridge broke.

Results
Of the three bridge designs I tested (warren-truss, pratt-truss, k-truss) the warren-truss held the most weight. I tested each design 5 times and the average for the warren was 43.6 pounds. The k average was 31 pounds and the pratt design was the weakest and averaged 13.6 pounds. I noticed that the breakage on most of the bridges was near the ends of the sections. I checked the types of breakage, as well, determining whether it was a snap, splinter, or bad glue bonds. The warren mainly snapped, but also had some splinters, The pratt design, was likely not built as well, and fell mostly because of bad glue bonds. The k-truss design had a lot of splintering.

Conclusions/Discussion
The warren-truss design worked best. It held a high of 66 pounds and the average weight held was 43.6 pounds. The k-truss design held an average of 31 pounds, the pratt design had an average of 13.6 pounds. I think the warren-truss design worked best because the design spread out the areas of compression and the areas of tension almost evenly throughout the bridge. This caused the load to be distributed evenly.

Summary Statement
I tested 3 different bridge designs (Warren-truss, Pratt-truss, K-truss) by building 15 popsiicle stick models and testing them to the breaking point.

Help Received
Mother helped by taking photos of tests for my report; Mother helped by working with me on putting together some of the bridges; Science teacher, Ms. Zeringue, reviewd and edited my report.