CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
J0220

Project Title
Bridging the World

Abstract

Objectives/Goals
The purpose of this experiment was to get an understanding of why bridges collapse and how the design affects bridge structure. My hypothesis was that the arch bridge would be the strongest, the cantilever would be the second strongest and the beam bridge would be the weakest. I thought that would be the case because arch bridges are made with a unique design that allows the top brick (keystone) to push on the bricks that make the arches. The arches push on the ground and then the ground returns the pressure to the key stone.

Methods/Materials
I built the bridges using wood blocks, cardboard, wooden dowels, a heavy-duty stapler, and wood glue. I then placed a plastic container in the middle of the bridge that I was testing and slowly filled it up with sand. I did this until the bridge started to crack and then I would weigh the sand and then continue filling up the container until the bridge broke and make another recording. I did this three times testing each type of bridge during all of the tests.

Results
I thought that the beam bridge would be the weakest, the cantilever would be second and the arch bridge would be the strongest and I was correct. The first beam bridge that I made was only able to hold up to 370g before it started cracking. I continued adding more sand until it broke at 2.5 pounds. The second beam bridge cracked and broke at 3.5 pounds and the third one broke at 2.5 pounds.
The first cantilever bridge started cracking at 3.5 pounds and it broke at 5.0 pounds. The second cantilever cracked and broke at 4.0 pounds, while the third one broke at 5.0 pounds. The arch bridge did not break at all.

Conclusions/Discussion
My hypothesis was correct. The beam bridges were the weakest, the cantilevers were the second strongest, and the arch bridges were the strongest.

Summary Statement
The purpose of this experiment was to get an understanding of why bridges collapse and how design affects bridge structure.

Help Received
My Mom helped me edit my graphs. She also checked my grammar. My dad helped me staple the frames and dowels on to the bridges.