



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Matthew J. Armstrong	Project Number J1802
Project Title How Much Weight Can That Bridge Take? The Impact of Structural Support Elements on the Strength of a Bridge	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective for this experiment is to find out which bridge, an arch, beam, or truss bridge, will support the most weight. The hypothesis for this experiment is that the truss bridge will support the most weight.</p> <p>Methods/Materials To perform this experiment, a total of two bridges for each bridge type (an arch, beam, and truss bridge) were built using popsicle sticks and a hot glue gun. Once the bridges were built, the beam bridge was tested first. The bridge was supported on each end by three bricks and a container was placed in the center of the bridge. Pre-measured lead weights were then put in the container one by one until the bridge broke. Once the results were recorded, the same test was performed on the arch bridge and the truss bridge. Each bridge was then tested again. Therefore, every bridge type was tested a total of two times and the results were recorded.</p> <p>Results The first beam bridge held 14.5 pounds. Beam bridge number two held 12 pounds so the average weight of the beam bridges was 13.25 pounds. Arch bridge number one held 21.5 pounds. The second arch bridge held 21 pounds so the average weight held by the arch bridges was 21.25 pounds. Truss bridge number one held 24 pounds. The second truss bridge held 23 pounds so the average weight held by the truss bridges was 23.5 pounds.</p> <p>Conclusions/Discussion The results of this experiment proved that the hypothesis was correct in that the truss bridge held the most weight. The beam bridge was the weakest holding the least amount of weight and the arch bridge was the second strongest bridge. The reason why the truss bridge is able to bear more weight is because it relies on compression and tension whereas arch bridges rely on mostly compression and beam bridges rely on mostly tension. The results from all of the experiments were consistent supporting the hypothesis although on most of the test bridges, some glue joints failed in addition to some of the wood breaking so wood glue rather than hot glue may give better results. In conclusion, beam bridges are useful for simple things like crossing a river because they are simple to build but truss bridges are most useful for heavy loads like railroads.</p>	
Summary Statement This project is to find out which bridge, an arch, beam, or truss bridge, can support the most weight.	
Help Received Dad helped build the bridges and helped test them.	