



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Paige E. Roper	Project Number J0221
Project Title Which Bridge Type Is Strongest: Arch, Beam, or Truss?	
Objectives/Goals The purpose of this project was to find out which type of bridge is the strongest - arch, beam, or truss. My hypothesis was that the arch bridge would be the strongest.	
Abstract Methods/Materials The experiment involved building and testing the strength three bridge types (arch, beam, and truss) by increasing the amount of weight on each bridge while measuring how much each deflected (bent), and at what point the bridges failed (broke). I built five sets of each type of bridge from wood, using approximately the same amount of material in each bridge to make a fair comparison. The bridges were designed to span a 13 5/8 inch gap. Each bridge was tested by adding weight to the center of the bridge 15 pounds at a time and measuring how much each bridge deflected, until the bridge failed or until I reached 150 pounds.	
Results My experiment showed that the truss bridge was the most rigid, but beam bridge failed the least. The truss bridge also had the lowest average point of failure - about 30 pounds less than either the arch bridge or beam bridge. The arch bridges bent more than either the truss or beam bridges.	
Conclusions/Discussion My hypothesis was incorrect. Overall the beam bridge appeared to be the strongest type, although the truss bridge was more rigid up until the point of failure. I observed that all of the truss bridge failures involved the separation of an end post joint, which were glued. Therefore, it is possible that stronger end post joints might lead to the conclusion that the truss bridge is the strongest.	
Summary Statement My project involved building, testing, and comparing the strength of arch, beam, and truss bridges.	
Help Received My science teacher, Mr. Scott, helped to edit my paper and advised me on my project; my father helped me with the construction and testing of the bridges and the preparation of my report; my mother made sure that I got everything done on time and helped me with my research on the topic.	