



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Matthew J. Armstrong	Project Number J0203
Project Title Truss Me: The Impact of Structural Design on the Strength of a Truss	
Abstract	
Objectives/Goals Objective: The objective for this experiment was to find out which truss design, a Warren, a Warren with Vertical Supports, a Pratt, or a Curved Chord Pratt, would have the best strength to weight ratio. The hypothesis for this experiment was that the Curved Chord Pratt would have the best strength to weight ratio.	
Methods/Materials Materials and Methods: To perform this experiment three trusses were built for each design (a Warren, A Warren with Vertical Supports, a Pratt, and a Curved Chord Pratt). They were built using wood glue and clear pine wood. They were then weighed. Then a truss was selected to be tested and placed on two barstools. Then a rope was attached to the truss and sent threw a pulley and then connected to a tension scale. The scale was then pulled until the truss broke. The breaking weight was recorded. Then the test was repeated with the other trusses. After all the trusses were tested the breaking weight for each truss was divided by its weight. This gives the strength to weight ratio.	
Results Results: The average strength to weight ratio for the Pratt was 1128 ounces to 1 ounce. The average ratio for the Warren was 1013 ounces to 1 ounce. The average ratio for the Warren with Vertical Supports was 1182 ounces to 1 ounce. The average ratio for the curved Chord Pratt was >1416 ounces to 1 ounce.	
Conclusions/Discussion Conclusion: The results of this experiment support the hypothesis. Even though the Curved Chord Pratt maxed out the scale at 177 pounds without breaking, it still had the best ratio and held the most weight. The results show that even though these trusses have very similar weights, their changes in design make a big difference in their breaking weight. It is important to choose the right truss design because of their difference in strength. The Warren is made for light loads like small cars or people because of its simple design and ease to build. The Curved Chord Pratt is made for very heavy loads like big, heavy trains, and finally the Warren with Vertical Supports and the Pratt are made for loads like heavy cars or trucks and light trains.	
Summary Statement This project is about how the importance of truss design effects how much weight it can support.	
Help Received Father helped build and test the bridges.	