



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) David M. Mikulka	Project Number J1818
Project Title Trusses: An Angle on Stress	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The intent of this project is to examine whether different angles change the strength of a truss during an earthquake. The hypothesis is that trusses formed of 60° angles will last the longest during a simulated earthquake.</p> <p>Methods/Materials The materials used in this project are as follows; an earthquake simulator and enough wood to build 60 trusses(I used 3mm by 3mm wood.) You will also need super-glue, corkboard and wax paper for making the trusses. Pins are very helpful for holding the joints together while the glue dries. A stopwatch/timer is also needed to time how long a truss lasts. A table saw capable of cutting at various angles is also needed. The testing procedure begins, after manufacturing the actual trusses, with placing a truss on the P-wave simulator. The simulator is then activated. Once the simulator is activated, a timer is set. Once the truss breaks, the timer is stopped and the time recorded. This process is repeated with half of all trusses, 10 of each type. Once all P-wave testing is finished, S-wave begins. The second half of the trusses are used, and the procedure is the same as for the P-wave testing.</p> <p>Results The results of this experiment are that the 30° trusses perform the best under S-wave testing, but the worst under P-wave testing. The 45° trusses perform the best under P-wave testing but the worst under S-wave testing. The 60° trusses, however, perform better overall. They are slightly lower than the 30°s in the S-wave testing, and slightly below the 45°s in the P-wave testing. Since an earthquake consists of both P- and S-waves, withstanding both is crucial.</p> <p>Conclusions/Discussion The findings show that while the 60° trusses are not the best at either type of wave, they are the best for the entire earthquake, which consists of both waves. This proves the hypothesis that an equilateral truss, or 60° truss, will perform the best during a simulated earthquake. This means that trusses(either in roofs or bridges)built in earthquake prone areas should be made from 60 degree angles.</p>	
Summary Statement My project is whether angle change how earthquake resistant a truss is.	
Help Received Father helped to build earthquake simulator, neighbor helped manufacture trusses.	