



# CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

<b>Name(s)</b> <b>Anjali Sinha</b>	<b>Project Number</b> <b>J0326</b>
<b>Project Title</b> <b>Quake'n and Shake'n: An Earthquake Experiment</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Earthquakes turn up out of the blue and we need to be prepared. I wanted to know what materials for joints would be best and what reinforcements would work well with them. I hypothesized that if the joints of the buildings had both flexibility and sturdiness, it would last longer, and that if a double crossed truss was applied to a building, the building would stand for a longer period of time.</p> <p><b>Methods/Materials</b> Using various items including wood, washers, a drill, and other metallic materials, I constructed a shake table on which my buildings could undergo their tests. I made buildings with gumdrops and toothpicks and another set with jumbo marshmallows and Popsicle stick and shook them on the simulator and recorded my results.</p> <p><b>Results</b> After finishing the experiments, I found that if the material at the joints is sturdy while flexible (gumdrops), the structure is more stable by 685%. Stability is also increased by 364% when the double crossed trusses are used in the building. After testing each building twenty times (in two sets of ten), I can say that the gumdrop buildings and the double crossed reinforcement truss buildings stood for about 50% or an average of eighteen seconds (or more) longer than the others. Without any reinforcements (control test), the gumdrop buildings stood for 13.351 seconds and with the double crossed trusses, these buildings lasted for 60.976 seconds. The marshmallow buildings originally stood for 1.701 seconds and with the double crossed truss, for 33.445 seconds.</p> <p><b>Conclusions/Discussion</b> Based on the data collected during my experiment, my hypothesis, that the gumdrops and double crossed trusses would work best, was proven correct. The gumdrops did indeed work best; they are slightly flexible but very sturdy. The marshmallows were flexible but not that sturdy and collapsed easily, especially when without reinforcements. The double crossed trusses stood out as the best reinforcement across the line. Outdoing all other variations, the double crossed lasted much longer. The cross gave the structure more support and contained all of the walls even if they started protruding. During the first few experiments, I encountered a few problems that included the structure of my buildings as some of them would just come undone or fall down without even being through the shake table but I found ways to resolve these. This year I am glad to have researched something beneficial to society.</p>	
<b>Summary Statement</b> After researching on the topic of earthquakes, I wanted to find out how the stability of a building during an earthquake is affected by the material of its joints and the reinforcements used in building it.	
<b>Help Received</b> Father helped build shake table; Mother helped time the experiments; My teacher helped by giving me feedback and pointers	