



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Zherui Xuan</b>	<b>Project Number</b> <b>J0398</b>
<b>Project Title</b> <b>Cantilever vs. Cantilever</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective in doing this project was to find out which combination of tension and compression pieces in a small wooden cantilever will carry the most weight before breaking. Because of another competition that have very similar requirements as this, my goal will be to decide on which type of cantilever I would use in my competition.</p> <p><b>Methods/Materials</b> Materials: For Building the Cantilevers: -1/8" by 1/8" balsa wood sticks, -super glue, -crafting knife, -ruler, -protractor, -paper and pencil. For Testing the Cantilevers' Capability: -smooth vertical surface, -measuring beaker, -water, -bucket with handle, -hook, -paper and pencil. I followed the standard scientific method: ask a question, do research, make a hypothesis, conduct experiment to test hypothesis, analyze data and draw conclusion, and share my results. My specific methods in carrying out my experiment is basically 4 steps: 1: Draw blueprints of my soon to be built cantilevers. 2: Construct the cantilevers according to blueprints. 3: Construct the cantilevers' testing apparatus. 4: Test all of the cantilevers and record the results.</p> <p><b>Results</b> The cantilevers that were doing the best were the ones with similar length of compression and tension. This makes my hypothesis false. All 10 cantilevers broke at where the base connects with the 2 supporting beams, not at the actual beams. That fact mislead my hypothesis. Degree of cantilever each with their liters of water held(refer to the "Question" page on board to know what the "Degree" is): Also note that the more or less the degree is, the more unequal the tension and compression beams, 70 degree being the most equal.</p> <p><b>Conclusions/Discussion</b> The more unequal the degree, the more unequal the forces are distributed. The cantilevers with small degrees will be mostly against the pushing force while ignoring the pulling force, and vice versa. The base of these "extreme" cantilevers are all split at one end because of the pressure the unrestrained force put on it, leading to the cantilever bending and breaking quickly.</p>	
<b>Summary Statement</b> My project is about identifying the best combination of tension and compression piece for a small wooden cantilever and to find out why.	
<b>Help Received</b> Father helped me pour water into testing device.	