



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> <b>Hayato S. Kato</b>	<b>Project Number</b> <b>J0316</b>
<b>Project Title</b> <b>Pasta Bridge: Which Shape Is the Strongest?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My project was to determine if the shape of a bridge affect its ability to hold weight. I think the arch structure is stronger. I think short beams minimize the pressure and small triangles help to strengthen the structure and to keep it stable. The truss structure will do the same work as small triangles. I predict that the combination of arch and truss structure is the strongest bridge.	
<b>Methods/Materials</b> Six types of bridges with variation (total: 14 types + 1 special type) were constructed with pasta. <ol style="list-style-type: none"><li>1. Place one pasta bridge on top of the two blocks</li><li>2. Hang the aluminum can on the middle bar at the base of the bridge</li><li>3. Slowly add one coin into the aluminum can and count ten seconds</li><li>4. Repeat step 3 until the pasta bridge breaks</li><li>5. Remove one coin from the aluminum can and then record how many grams the pasta bridge held</li><li>6. Repeat 5 times per type (total: 75 times)</li></ol>	
<b>Results</b> The Simple Triangle Bridge was the weakest. The Sunset Suspension Bridge with 5 beams held more weight than the one with 3 beams. The Sunrise Suspension Bridge was about the same as the Sunset Suspension Bridge and adding more beams to the bridge made the bridge stronger. The Suspension Vertical Bridge held about 2 times more than the Sunrise and Sunset Suspension. The Kobe Suspension Bridge held more weight with more structures. The 1/3 Arch Bridge held about the same weight as the 1/4 Arch Bridge.	
<b>Conclusions/Discussion</b> My conclusion is that the combination of arch and truss structure is the strongest bridge. I created a dream bridge that is based on the data I collected from 14 different types of bridges. Its base is the 1/3 Arch Bridge with truss structure that held most weight and I added few extra poles to it. The bridge's weight isn't different that much from the other bridges but the weight it held was about two times more than the other ones.	
<b>Summary Statement</b> Does the shape of a bridge affect its ability to hold weight?	
<b>Help Received</b> Father helped work on the aluminum can; Mother helped cut out the pasta, create the base support and print out.	