

Bridge Angles: Which is the Strongest?

Research Question

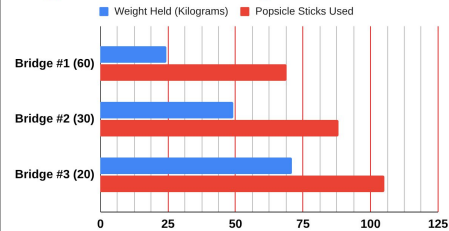
- How does the angle of a triangle in a truss bridge affect how much weight it can hold?

Methodology

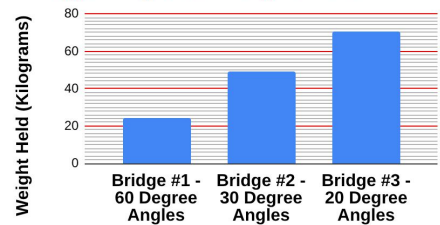
- Starting with bridge #1, put the two supports on opposite sides of the bridge, 5 cm onto the bottom of the bridge edge. ****Tip: After putting weight on the bridge, wait 10 seconds before adding more.****
- Start by putting a good balancing object on the top of the bridge for the rest of the weights. It shouldn't weigh very much (about ½ a kg).
- Continue by adding weight in 2.2 kg increments, when it reaches 4.5 kg, switch to a 4.5 kg weight, then continue. Do this with 4.5, 11, and 20 kg weights.
- While adding weight, look for bowing (bending) in the bridge to determine when the bridge is about to break, then start adding smaller increments.
- When the bridge breaks, record data.
- Repeat these steps with bridges #2 and #3.

Data & Results

Weight Held Compared to Popsicle Sticks Used



Bridge Angle to Weight Held



Interpretation & Conclusions

After testing my hypothesis in my experiment, I found that my hypothesis was correct! The angle of a bridge does affect the amount of weight held by the bridge; especially the more acute the angle, the more weight that will be held by the bridge. I came to this conclusion according to my experiment, as the bridge with the 20° angle held the most weight, with the 30° and 60° angles holding less and less weight. In real world applications, when building a truss bridge, the angle of a bridge is stronger when the angles are smaller.

For future experiments, I would like to pinpoint the variable of the number of popsicle sticks used. When I discussed my experiment with multiple people, they all made the remark of how the bridges may have held more weight because of the fact that there was more material in some of the bridges. To isolate this factor, I want to design bridges that would use the same amount of popsicle sticks, but keep the same angle requirements.