# Steps for building a bridge!!

# Abstract

My project is about the process of building a bridge and finding the weaknesses and strengths of the design and finding a way to fix the flaws with a redesign. I will learn how much weight the bridge can hold using the weight of Alani soda cans.

# Research!!

https://teachersinstitute.yale.edu

A suspension bridge is held up by cables secured by anchorages, the cables are attached to two tall towers. The cables can be draped over long distances because of the towers

https://user.eng.umd.edu

Materials used to make what holds the deck up are steel or masonry. The deck of the bridge is made out of girders and trusses.

https://www.ce.jhu.edu

Tension is needed in the cables to reduce sag in the middle. The railing on the bridge is mostly to protect the people on the bridge.

# Problem that needs to be solved

People are running out of materials used to make bridges so I will use different materials that the world has a lot of and use the materials to make a bridge. I will make the support for the bridge out of foam then attach the bridge to popsicle sticks in the foam. The bridge will be made out of beads with popsicle sticks layered on the top and bottom with hot glue.

# Procedure

To test the prototype I will test it’s weight holding Alani soda cans on the bridge. I will use a measurement system of the soda cans then translate that to pounds. I will add more weight till the structure breaks or the popsicle sticks crack a lot then find the max weight the bridge can hold.

# Hypothesis

I think the bridge will hold 12-15 cans. If the popsicle sticks start to crack I think the bridge will be able to hold 2 more soda cans before it breaks. If the popsicle sticks break then I think the beads will be able to hold at least 3 soda cans for 5 seconds before they fall off the bridge.

# Weaknesses in prototype

-The length of the rows of beads were uneven

-Sides didn’t have enough support and could fall

-Duck tape wouldn’t stick when a lot of soda cans were on the bridge

# Strengths of prototype

-Hot glue holding the popsicle sticks together was very strong

-The popsicle sticks were very strong

-The foam holding the bridge didn’t break too much

# Fixes made for the redesign

-The rows of beads were made even

-The cardboard was replaced with more foam

- dowels were added to create more stability and support for the bridge

With the new design the beads were made longer so more popsicle sticks were used. That way it will be stronger and hold more weight for longer amounts of time.

# Strengths and weaknesses in redesign

-Strengths

-More beads used to make the bridge

-Small popsicle sticks put on top of larger ones

4 dowels used as anchors for bridge support

-Weaknesses

-The bridge is slightly tilted

-Foam is a bit uneven

-The weakness in the middle of the bridge was transferred to the foam

# Materials used

-Small and large popsicle sticks

-Pink, orange, yellow, green, blue, and purple beads

-Elastic cord (string)

-Hot glue

-4 bricks of foam

-paper clips and ruler

-4 dowels

-Duck tape and cardboard

# Results of redesign testing

The bridge held 25 Alani soda cans and did not breaks or crack. It could hold more but I stopped at 25 because the tower of soda cans was getting too tall. Since the bridge held 25 soda cans I will translate it into 25 pounds.

The goal for the bridge to hold was 12-15 soda cans and it held 25 cans.