

Build a bridge



Purpose: To build a scaled version of a bridge out of toothpicks and glue that will allow a car to cross the cliff. To make proper adjustments to your initial design as there will need to be modifications as the need arises.

Background: Your team has to come up with a bridge that will allow 2 cars with a pass over it at the same time in opposite directions. The width of the cliff is 30 feet across.

Procedures: Steps 1-6 are individual.

1. You will need to measure the length of the car of a toy car to get the scaled and double that number because we want to a 2 lane bridge.
2. Google and search the width of a typical Jeep Wrangler as that is the model vehicle we are using.
3. You will need to research with some bridges look like and what specific structures / designs to have enough strength to hold 2 vehicles at the same time.
4. Proportion out the size of the scale model you will need and the bridges length, width and height.
5. You (each person) will need to draw a scale / model on graph paper of BOTH what a side view and a top view of your bridge will look like. You will need to have in your drawing the actual (width, length and height in cm) then the proportioned to scale in feet. actual (width, length and height)
6. You will have to come up with some Pros and Cons to your bridge design.
7. You will be placed into groups of 3.
8. You will then need to pick the best choice out of your groups with at least 3 reasons to why you feel that bridge is better than the other 2 choices.
9. Next you will need to gather your materials for the bridge.
10. You will need to construct your bridge using ONLY glue and toothpicks.
11. Get a new sheet of graph paper and draw out your final bridge. Measure the length, width and height of your final bridge in cm.
12. How big (use the proportion you used on the original) to see how big your final bridge's dimensions are.
13. Challenge 1, we will see if it allows the passage of 2 vehicles at the same time. (width)
14. Strength/Structure Challenge will be to see how much mass the bridge can hold until its structure fails.

- a. The typical jeep wrangler has a weight of 4,100 pounds. Using the proportion that 1 washer equals 50 pounds. How much mass could your bridge hold?

Reflection Questions

1. Would your bridge have been able to handle the mass of 2 jeep wranglers at the same time?
2. Support your answer with data.
3. How many total vehicles (if they all weighted the same as a jeep wrangler) could your bridge have held? (Remember you can't have part of a car its all or nothing)
4. Support your answer with data.
5. How similar was your original design to the actual bridge you built?
6. What is ONE specific change that you had to make from your original sketch (drawing)?
7. If you could have used 1 additional material which would you choose **and** why? (Hot glue, popsicle sticks, string, tape, etc.....)
8. If you were to build this again (think about the strategies, structures, designs of other groups), what would you have done different (you must choose something).
9. Who was 1 group member, out of a scale of 1-10 (10 the best) how would you rate their performance? Give a couple examples of what they specially did or did not do.
10. Who was the other group member, out of a scale of 1-10 (10 the best) how would you rate their performance?
11. Evaluating yourself out of a scale of 1-10, how would you rate yourself on this project. Provide a couple specific examples of what you specifically did.