

Bridge to Nowhere Project
Planet Holloway Physics

Objective: Design and build a bridge to hold 15 kg, up to a maximum of 22 kg (44 lbs) using only popsicle sticks ($4 \frac{1}{2} \times \frac{3}{8}$) and glue. The more weight you can support, the better your score can be. (*Do not use* tongue depressors, which are double width, or coffee stir sticks or balsa wood).

Requirements: The bridge must cross a 22" gap. The edges of the testing tables will be 22" apart. This means the bridge must be longer than 22", I know that seems obvious, but every year someone comes in with a great looking bridge that is too short and therefore fails.

The bridge must allow 6" of clearance for the middle 12" of the bridge. This means that when the bridge sits on a desk I should be able to pass a 6" high stack of books beneath the bridge without making contact with any part of your bridge. Imagine that there is an obstacle in the way that your bridge must go over.

The bridge must allow for a 3" x 3" x 2" testing block to be located at the center of the bridge with access to the $1 \frac{1}{2} \times 1 \frac{1}{2} \times \frac{1}{4}$ " hook on the bottom of the testing block. It is from this block that the bucket holding the test weights will be added. You may decide where the block will be placed on your bridge, but it must be within 4" of center and it must allow for the attachment of the testing bucket. Be sure you know what the loading device looks like before you build your bridge. Remember, if I cannot load the bucket on your bridge, your best possible score is a D.

This is an engineering project. Efficiency and strength are being rewarded. Your design and build incredibly important to your score. There is no limit to the amount of glue or number of Popsicle sticks ($4 \frac{1}{2} \times \frac{3}{8}$) you may use, but remember, the heavier it is, the worse your strength to weight ratio is. Try to build light and strong. A typical popsicle stick with a small dab of glue is about 2 grams. You need to plan which category, weight designation, you will be competing in. Scores vary by weight class. Look at the scoring rubric carefully before beginning your project and plan accordingly. Design is very important, so research, plan and test before building your final bridge. Also, no part of the bridge may hang over the edge of the testing tables for support. A bridge is done when one stick breaks or the bridge sags by 1.5".

Research: Included in this project is a research report on topics related to bridges.

- Identify four different types of bridges and the pro and cons of each style. Identify three different types of forces a bridge encounters and how the design enables the bridge to handle those forces.
- Briefly describe the Tacoma Narrows Bridge incident and why it happened.
- Include a sketch of your bridge and a description of key parts. Explain the strengths and weaknesses of your design and estimate how much you expect your bridge to hold.

Grading: There are two grades for this project, one for the research and one for the bridge. The research is worth 50 points and the bridge is worth 300.

Scoring for bridge –

Weight Class (in grams)	Base points before testing
< 150	165
150.5 - 200.4	150
200.5 – 250.4	135
250.5 – 300.4	120
300.5 – 350.4	105
350.5 – 400.4	90
> 400.5	75
Categorical points	Points from testing
Holds loading block	25
Holds bucket	50
Kg masses held (22 kg max)	x 5 pts / kg held (from 5 – 110 pts)

Bridge to Nowhere Grade Sheet

Team Members –

This is to be the cover sheet for your research portion of the project
 Leave this blank until test day, we will fill it out in class.

Research paper turned in	Yes	No
Bridge is over 22 inches long	Yes	No (100 pt penalty)
Bridge allows 6 inches of books to pass beneath without touching	Yes	No (100 pt penalty)
Category	Score	
Bridges allows for loading block – 25 pts		
Bridge holds bucket empty – 50 pts		
Mass of bridge - _____	Base points =	
Mass held by bridge - _____ (x 5 pts / kg)		
Total bridge score		
Research score		
Total project score		