STEM Event Module: Bridge Building

Developed by Caden Boyer, CoEng K-12 Outreach Specialist, February 2022

**Grade:** 6-10th

**Volunteers:** 1-2 (larger groups will require more volunteers, primarily for help with hot glue and setup)

**Space:** 1 table-worth of workspace for each group of two and two tables for testing bridges

**Time Commitment:** 1 hour set-up. 30 minutes designing, 1 hour building, 30 minutes testing.

**Objective:** Students (in groups of two) use the materials provided to design and build a bridge that will support the most weight.

**Materials Needed:**

* Paper
* Pencil
* 80 Popsicle sticks per group
* 30 Jumbo Popsicle sticks per group
* Hot Glue

**Available Resources:**

* PowerPoint presentation for activity instruction and background
* Activity handout for students to follow along as they go

## Activity Instructions:

**Step 1:** Design the bridges. Have students sketch out their bridge designs with labels and dimensions. Once a volunteer or instructor has approved the design, students may begin building.

**Step 2:** Build the bridges. Using their group’s kit, students begin constructing their bridges, getting help from a volunteer or instructor with hot glue.

**Step 3:** Test the bridges. Once all bridges are complete, test the bridges by placing them across a gap and adding weights until they break, or there are no more weights. Have students be considering the discussion questions at this time.

## Safety/Organizational Tips:

* Make sure that hot glue is either always under supervision or is only used by volunteers and instructors.
* Pre-make kits ahead of time to be handed out to the groups, to prevent a free-for-all.
* Set timers for the different phases of the activity, so that students all proceed at the same pace.

## Follow Up:

If facilitating this activity in a classroom, or in an event structure that allows follow up to the activity, use these discussion questions to guide students through reflection and learning:

* Did your bridge survive the weight? Why do you think that is?​
* What was the strongest part of your design?​
* What was the weakest part of your design?​
* What would you do differently if you built a prototype again?

## Classroom Extensions:

* Using similar materials, have students build towers, in an attempt to build the tallest freestanding structure. Also see the “Spaghetti Tower” STEM event module.
* Talk about stresses like gravity and weight force and how they affect a bridge, and how you can design a bridge to withstand those stresses. Also see the Crash Course Engineering videos, which you can find here: <https://thecrashcourse.com/courses/civil-engineering-crash-course-engineering-2/>
* Give students the “Is Civil Engineering For You?” handout to fill out, and then talk about their results.