

# BE A MATH NINJA

## ACTIVITY INSTRUCTIONS

**Lesson:** Bridging the Gap

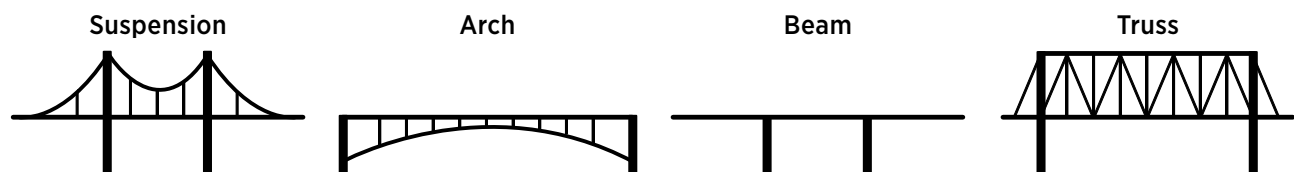
**Tiered For:** Grade 5–6

**Objective:** Students will be able to consider mathematical and engineering principles as they design a model of a structure

**Materials:** 75 craft sticks per group, glue, small container, Bridging the Gap Student Worksheet

1. Ask students if they know of any famous bridges. Examples might include the Golden Gate Bridge, Tower Bridge in London, George Washington Bridge, etc. Ask them if they can describe the features of these bridges (e.g., suspension cables, towers, etc.)
2. On the board, draw diagrams of the major types of bridges, including suspension, arch, beam, and truss bridges. Point out the characteristics of each type. Suspension bridges tend to be used for longer distances. The roadway is held up by a series of suspension cables. Arch bridge design has been used for thousands of years. The curved design of the arch bridge spreads the load to the supports at either end of the bridge. A truss bridge uses triangular structures in the design to support the load. Beam bridges are supported by piers at either end. If a beam design is used to cover longer distances, additional piers will be necessary.

### Common Bridge Types:



3. Divide the class into teams of three to five students each. Explain the rules as indicated on the worksheets and distribute the worksheet and materials.
4. Give the class 30 minutes to design and build their model bridge and fill out the design portions of the worksheet.
5. The next day, have groups present their models to the class, explaining the thinking that went into the design.
6. Test each bridge by placing a container on top of the model. Add increasingly heavier weights until the model collapses. The bridge that holds the most weight before collapsing is the winner.
7. Review the activity with the class, discussing why some designs were more successful than others.

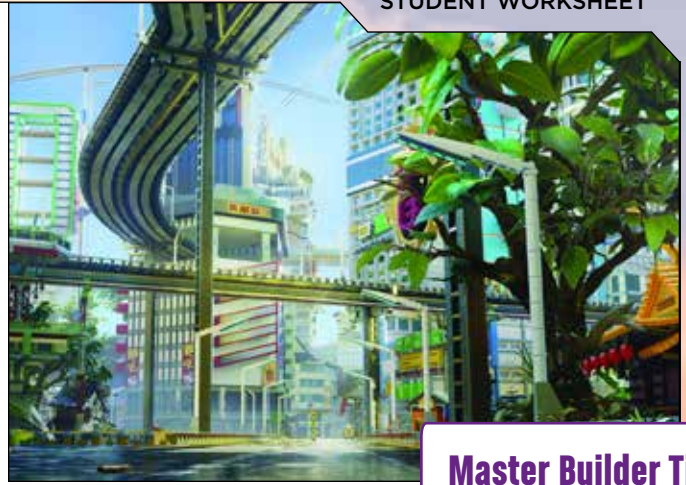
## ***Bridging the Gap***

NINJAGO City has begun a massive construction project to connect the isolated sectors of the city with a series of bridges. The leaders of the city have invited engineers to submit their designs.

During the design phase of a project, engineers often use models to test their design ideas. Design a bridge for the city, and then build a physical model of it to see how well it works.

### ***Directions:***

- Your model bridge must be at least 1 foot long.
- You and your group will have 75 wooden craft sticks and glue to use.
- The bridge able to hold the most weight is the winner!



### **Master Builder Tip:**

Triangles are very strong shapes. Try putting them into ***your plan!***



Draw a picture of your design:

Explain how you came up with your design:

How well did your design work? What would you do differently next time?