

Secret Engineer: How Emily Roebling Built the Brooklyn Bridge

by Rachel Dougherty

Lesson

Bridge Building Basics

INTRODUCTION: After learning about Emily Roebling and the Brooklyn Bridge, students can be challenged to construct a bridge of their own, using a variety of materials.

TIME ALLOCATION: 30-45 minutes

GRADE LEVEL: 2-5

MATERIALS:

- Book: Secret Engineer: How Emily Roebling Built the Brooklyn Bridge
- Construction materials: such as spaghetti, toothpicks, popsicle sticks, cardboard, marshmallows, gumdrops, tape, glue, paperclips
- Weights to test the amount of weight the build will hold. Examples, pennies, paperclips, dried beans.
- Rulers

OBJECTIVES:

- The student will learn about Emily Roebling and her part in the construction of the Brooklyn Bridge.
- The student will learn about various bridge designs.
- The student will, using a variety of materials, design and build a bridge that hold as much weight as possible.
- The student will record their design and challenge results on an activity sheet.

PROCEDURE:

1. Introduce the lesson by showing the students the cover of *Secret Engineer: How Emily Roebling Built the Brooklyn Bridge*,
2. Ask the students if they can guess when the Brooklyn Bridge was completed. (1883)
3. Read the book to the students if time allows. You may also show them a YouTube reading. <https://www.youtube.com/watch?v=vmGROuIGx20> [9 minutes]
4. Display the visual, Bridge Building Challenge and review its content with the students.
5. Divide the class into pairs or small groups.
6. Distribute the activity sheet, and show the students the available building supplies.

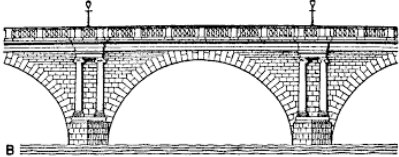
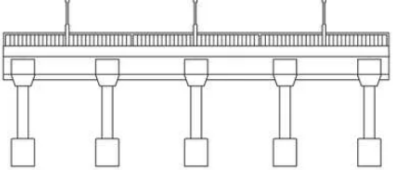
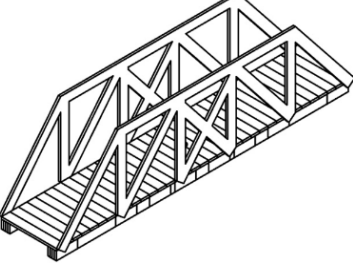

You may wish to limit the number of materials each group can select. You also may presort the materials into plastic bags if you want each group to have the same materials.

7. Once the bridges have been constructed distribute the weights and instruct the students to test the strength of their bridge. Students are to record all information on the activity sheet.
8. Review their responses, determining which bridge was able to support the most weight.
9. Conclude the lesson by asking the students the following: Did your team design a strong bridge? What was the best part of the bridge you constructed? What would you have changed?

Visual

Bridge Building Challenge

Types of Bridges

<p>Arch Bridge</p> <p>Bridges that are arch-shaped and have supports at each end.</p>	 A cross-sectional diagram of an arch bridge. It shows a large central arch supported by two piers. The bridge deck is on top of the arch. There are small vertical markers on the top of the bridge deck.
<p>Beam Bridge</p> <p>Horizontal beams supported at each end by piers</p>	 A top-down diagram of a beam bridge. It shows a long horizontal beam supported by five vertical piers. The beam is supported at its ends and by the piers.
<p>Truss Bridge</p> <p>Bridges made from a triangle frame.</p>	 A 3D perspective diagram of a truss bridge. It shows a triangular truss structure supporting a deck. The truss is made of interconnected beams forming a series of triangles.
<p>Suspension Bridge</p> <p>Bridges suspended from cables.</p>	 A perspective diagram of a suspension bridge. It shows two tall towers supporting the bridge deck with cables. The deck is suspended from the cables. The bridge has a long span between the towers.

Bridge Building Vocabulary:

- **Deck:** A bridge's surface that
- **Load:** The forces that a bridge must resist, including the weight of the bridge and anything on it


- **Span:** The part of the bridge deck between supports

Activity Sheet-

Bridge Building Challenge

Directions: Using the bridge building materials, design and build a bridge that can support the provided weights.

Drawing of Bridge

Materials Used	
Bridge Dimensions: (in inches)	
Height:	
Width:	
Length:	
Number of weights bridge held:	

Name: _____

Teddy Bear STEM Bridge



We worked in groups to make a bridge for our teddy bear counters.
Our goal was to fit all of our bears on the bridge at the same time!

Our materials:



We used _____
teddy bear
counters.

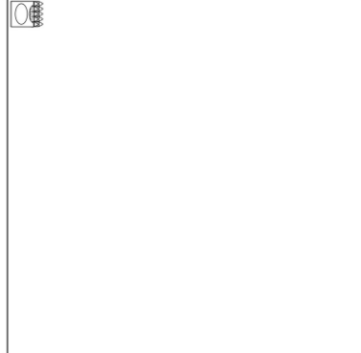


We used _____
popsicle
sticks.



We used _____
cups.

Here's how our bridge looked:



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UN!