

Activity #4 (Part 1 of 2)

Bridge Over Troubled Water

Introduction:

Bridges are structures which carry people and vehicles across natural or man-made obstacles. There are many types of bridges. Bridges are shaped differently and use a variety of materials depending on the length of the barrier to be crossed, the amount and type of traffic, and the forces of nature (wind, tide, flood, ice) which will impact it.

Objectives:

After completing this activity, students will understand:

- Bridges are categorized into three primary types: suspension (cable stay), beam (truss), and arch.
- Each is designed and built according to certain principles of engineering.

Session Time: 60 minutes (not including extensions)

Materials:

Each team will need the following:

- “Building Bridges: The Basics” packet (Included in Activity #9)
- Twenty drinking straws
- One meter of masking tape
- Two stacks of books or blocks of wood
- Meterstick
- Jar of pennies or marbles

Methods: guided discussion, cooperative learning, interactive participation, spatial reasoning, geometric modeling

Procedure:

1. Divide students into teams, provide each team with the necessary materials, and challenge each group to build a bridge that will span 25 centimeters.
2. Set the following rules:
 - a. For the two ends of the span, students will use two stacks of books or wood blocks placed 25 centimeters apart.
 - b. The only materials students may use for the bridge itself are 20 drinking straws and 1 meter of masking tape.
 - c. The straws may be shortened, bent, or cut.
 - d. No part of the bridge may touch anything between the two ends of the span.
3. Allow each group to study the “*Building Bridges; The Basics*” packet (Activity #9). They should find out the basic principles of the three main kinds of bridges: suspension, beam, and arch.

Activity # 4 (Part 2 of 2)

4. Allow each group to brainstorm ideas, make sketches, and choose a final design for their bridges.
5. Have each group build their bridge.
6. After all bridges have been completed, have students test their bridges by seeing how many pennies they will hold. Students may modify their bridges, at this point, and then see if they will hold more pennies.
7. Have groups present their bridges and testing results to the class. Ask students to speculate about why some bridges were more or less successful than others. What factors went into the strength or weakness of each bridge? What flaws were inherent in the building materials? How were those flaws overcome? How could the bridge be improved?
8. For more of a challenge, have students increase the span to more than 25 centimeters.

Extensions:

- What is the longest bridge in your area? Why was it built? What factors determined the materials used to design and build it? Did the builders face any special challenges?

Activity adapted from: <http://school.discoveryeducation.com/lessonplans/programs/bridges/>