

JUNK BOX WARS

Bridge Challenge

Build a bridge that will support the most weight!

Competition Rules:

Each team will be provided with a junk box filled with materials that may be used to build a bridge. Each team will receive only one set of materials! Teams may use all or part of the materials provided and are not allowed to share materials with other teams. Scissors and hot glue guns will be provided by the teacher.

Teams will be allowed time to build and test their bridges. Competitors are allowed to bring diagrams to help them build their bridges. After the time is up, all bridges will be impounded and no changes will be allowed!

Junk Box Possible Supplies

Dowel Rods
Wooden craft sticks
Rubber bands
String
Masking tape
Index cards
Newspaper
Pipe cleaners
Straws
Hot glue
CDs

Structure Requirements:

The bridge must be able to span the entire width of the canyon or space between two tables. Bridges may be attached to the sides of the canyon with tape. Bridges must also be constructed with a smooth road bed and enough room to allow the vehicle to move freely along the entire length of the bridge.

Testing Procedure:

Teams will begin testing using an empty vehicle. The vehicle must be pulled over the complete length of the bridge to be counted as a successful trial. If the bridge supports the empty vehicle, team members will add more mass and continue the testing process.

At the time that the bridge fails to support the vehicle and the load, testing will be done. Bridge failure is defined as breaks in the road bed or structure that prevents the vehicle from traveling over the bridge. In the event that the vehicle leaves the bridge structure, testing will be done.

The team with the bridge that supports the largest mass will be declared the winner. In the case of a tie, the team with the lightest bridge will be declared the winner.



Bridge Challenge

Team Name: _____

Team Members :

Mass of Bridge = _____ Total Mass Supported = _____



Bridge Challenge

Team Name: _____

Team Members :

Mass of Bridge = _____ Total Mass Supported = _____



Bridge Challenge

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Bridge Challenge

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Team Members :

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Bridge Challenge Teacher Notes

Recommended Supply List

- 4' Dowel Rod - May be cut
- 100 Wooden craft sticks
- 20 Rubber bands
- 200 cm String
- 500 cm Masking Tape
- 50 Index cards
- 5 Sheets of Newspaper
- 50 Pipe cleaners
- 50 Straws
- 10 Sticks of Hot glue and gun
- 10 CDs

Also needed for competition:

- Masses - Large metal washers or pennies
- Mass Container - Toy vehicle or wagon that can hold the masses
I use a plastic toy dump truck from Walmart. A string is attached to the front bumper and used to pull the vehicle across the bridge. You could also use a remote-controlled truck with a bed large enough to hold the masses.
- Canyon - See diagram at the bottom of this page

Notes:

(1) Students may use all or part of the materials in the junk box. I allow the students to use any material inside the box, but not the box itself. For example, if any of the materials come in wrappers or boxes, teams may use those for the device. The materials may be modified with the understanding that if a goof is made they will not receive new materials.

(2) Students may build a variety of bridges as long as the design meets the structure requirements outlined in the rules. Before the competition, you will need to measure the width and height of the vehicle as well as the distance across the canyon or space between the tables. Students will need these measurements during the construction phase. Bridges that fail to meet the requirements will be disqualified.

(3) Before testing, measure the mass of each bridge and record on the event score sheets. To test the bridges, each team starts with an empty vehicle and pulls it across the length of the bridge. The vehicle must travel the complete length of the bridge to count as a successful trial. If the bridge supports the load, the team members will need to add 2 washers (or 20 pennies) to the vehicle and continue the testing process. At the point that the bridge fails to support the load or shows signs that safe travel is not possible, testing will be done. If the vehicle leaves the bridge structure or becomes stuck on the bridge, that team will be finished testing and the highest load held successfully will be used for scoring purposes. In the case of a tie or bridges that support all the washers or pennies available, the lightest bridge will be the winner. To determine the total load supported, use a scale balance to measure the mass of the vehicle and additional objects.



Create the canyon area using two tables that are 30 cm - 60 cm apart.

Teams are allowed to tape the ends of the bridge to the testing platform with tape if they have enough left over after the bridge is constructed.



Bridge Challenge Important Measurements

Distance across canyon

_____ cm

Width of vehicle

_____ cm

Height of vehicle

_____ cm