

Welcome to Engineering! Thank you for volunteering your time and sharing your talents.

Goal: In this module, students learn to work with their group to create a bridge using limited time and material.

Divide the students into groups of 2-3. If you have an odd number, you may have a group of 4, but no more than 4 students per group. There will be two groups per table. For each group, there should be one bag of spaghetti (25 pieces), 1 yard of masking tape, 2 wooden blocks, a ruler, the Bridge Criteria laminated paper, and a small container for weighing.

Introduce yourself and briefly share your career/education background.

Opening Comments: Tell the students that one of the keys to being successful in a career is through teamwork and problem solving. This requires creativity, innovation and thinking outside the box, but also being able to develop a plan and execute it as a team.

In this activity, their team will have 18 minutes to work together to construct a bridge using only spaghetti and masking tape. The winning bridge will be able to hold the most weight without the bridge breaking.

A bridge by definition is a structure spanning two points to create a passage for vehicles, trains, people, etc. usually over some type of obstacle such as water.

Bridge Criteria:

- Teams may only use the materials provided. This includes one yard of masking tape, 25 pieces of spaghetti, and 2 blocks to place the bridge onto.
- The ruler is for checking the bridge dimensions and the block placement.
- Teams may not use any other materials to assist in building the bridge.
- They will have only 18 minutes to finish the bridge.
- The bridge must sit on the 2 blocks placed 8" apart.
- The bridge must be a minimum of 4" wide and a maximum of 6" wide.
- The length of the bridge should be about 10", approximate length of one piece of spaghetti.
- No part of the bridge may touch the table or below the block top/surface area.
- No taping the bridge to the blocks.
- The weighing container will be placed at block height in the center of the bridge.
- Spaghetti may be broken into smaller pieces. However, broken pieces may not be replaced.

How Strong is the Bridge?

- After a team has finished their bridge, they will let the volunteer know. The volunteer will go to the station with the bolts (weights).
- First check to make sure the bridge meets the “Bridge Criteria”.
- Then make sure the weighing container is placed on the center of the bridge.
- You or the students can add bolts until the team says to **STOP**. The goal is to hold as much weight as possible without the bridge failing/breaking.
- After a team thinks they have held their maximum weight without the bridge failing the volunteer can weigh the container with the bolts to see how much the bridge supported.
- Record the results and on the Score Sheet.
- If the bridge fails/breaks, the team is disqualified.
- Failure is the structure breaking, joints separating, or container falls. It will be the volunteer’s job to determine if the bridge has failed.
- The team that supports the largest weight (most bolts) without failure will be considered the winner.

Monitor team progress and remind teams of the rules if necessary. You may at some point during the eighteen minutes explain to the students that one of the strongest structure shapes is a triangle. You will be the timekeeper. ***When two minutes remain***, announce that there are two minutes remaining. Do this at one minute also. If a team finishes before the 18 minutes is up, they may have their bridge tested early. Declare a winning team and record it on the score sheet.

Conclusion: Discuss with the students what they just learned through this activity. Talk about teamwork, types of structures, what worked and what didn’t work.

After each rotation, throw away all used tape and spaghetti. Reset each table for the next group.

End of the Day:

- **Throw away any used tape and spaghetti.**
- **Collect materials, Volunteer Instructions, unused scoresheets, and any other items and place them in the Engineering Supplies bin.**
- **Collect and place the blocks in the Engineering Blocks bin.**

Thank you for making a difference today!!