

Spaghetti and Gumdrop Buildings

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Educational Goals: Learn basic principles of how to construct a bridge.

Discipline: Structural Engineering.

Description: Students construct the tallest building structures they can using only spaghetti and gumdrops. The structures must be stable and designed to carry a small load or sustain a simulated seismic event.

Time: Varies, 30 – 60 minutes.

Materials: Each Group: one box of spaghetti (Ronzoni Spaghetti-8 works well), one bag of small to medium size gumdrops (40-50 per bag), one large sheet of paper (24" x 36" plot size or similar).

Mentors: measuring tape, camera for final presentation and ACE website photos, small book or similar weight for loading.

Additional Resources: None

Activity: Group Activity

1. Begin with some basic structural design concepts: loads, load paths, strength of materials, connections, building design, and structural framing. They should be practical, like why 1st floor columns are typically bulkier than 10th floor columns. Keep this under 10 minutes.
2. Break up into groups of 2-4 students each.
3. Distribute the materials to each group.
4. Discuss the rules of the competition:
 - a. Each group can only use the materials distributed to them, building their structure on top of the sheet of paper.
 - b. There is no limit on the number of structural elements (spaghetti strands) used to make up individual columns and beams.
 - c. There is no limit on the number of joints (gumdrops) used.
 - d. Set a construction time limit, anywhere from 20 to 45 minutes, depending on how long your session runs.
 - e. The tallest structure to stand unassisted and to – withstand a simulated seismic event (by sliding the paper on which the structure stands back and forth) or sustain a small gravity load (by placing a small book or other lightweight object on the structure) wins the competition. (Mentors can decide whether to do the seismic test, the load test, or both.)



5. Mentors should patrol the “construction area” during the competition. Offer tips and advice to the students, answering their questions, and taking lots of pictures.
6. When the structures fail (they normally do!), discuss why. Was it a joint failure, or did a compression member snap? This can be a quick and interesting discussion on failure mechanics.

OPTIONAL: Award the winning team a small prize (an architectural or engineering scale, a book, a poster, a company bag or T-shirt, etc.)

OPTIONAL: End the session with pizza and soda. (Highly recommended!)