

## BEAM Lesson Plan

Lesson Name: Straw Building + Marshmallow Challenge

Lesson Type: Construction/Process

Target: Elementary School/High School

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### Challenge:

Build the tallest structure using straws and masking tape. The structure must support one large marshmallow.

**NOTE: SITE LEADERS**, please return leftover straws and tape to Bechtel!

### Materials:

#### Per group of 4-5 students:

- 20-30 Straws
- 1 large marshmallow

#### For mentors:

- Tape measure
- Masking Tape

### Rules:

- Work in teams of 4 or 5 to build the tallest structure
- Structure must support the weight of one marshmallow placed at the top, must use whole marshmallows
- May or may not want to impose a tape limit (around 1 yard/3 feet is a good amount, or 5 ft)
- Straws can be cut into smaller straws if you want
- Straws can be taped to table
- Marshmallow is given to students at the beginning of challenge
- Each team gets 20-30 straws (depends on # of students/materials available)
- Time limit of 20 minutes for elementary and high school students (or use variation below)
- Variation for high school students: Make the tallest structure possible + supports the most marshmallows. Will probably need to bump # of straws up to 30-40 and time limit up to 30-40 minutes. Use a point system (#inches of structure x #marshmallows supported) to decide winner, one marshmallow is given at the beginning as a tester
- If time permits, run the challenge twice.
  - First run: marshmallow is put on at the end of the building phase.
  - Second run: marshmallow is given to students at beginning and students are allowed to test as they build
  - What does this show about the design/building process? (Prototyping)

### Lesson Plan:

- Name Game/Introduction (~10 min): Introduce yourselves, do name game/ice breaker, etc.

- Introduce the challenge (~10 min): Perhaps talk about what makes a good structure. Have someone prepare to pass out materials.
- Start challenge (~20 min/30 min for variation): Have mentors help if necessary, give basic advice if asked. Answer questions. Mainly let the students roam free. Give groups time warnings in 5 minutes intervals and at 3 minutes, 1 minutes remaining.
- Decide winner (~5 min)
- Do challenge again if running challenge twice (~20 min)
- Decide winner (~5 min)
- Discussion (~10 min): Talk about the challenge, what worked, what did not. Etc.

**Questions:**

- Did your group prototype as you built? Would that have helped or not?
- What kind of base did you use for your structure? What would make a good base?
- What about the supporting sides of the structure? What kind of shapes reinforce the structure? What shapes do not?

**Advice:**

- Tape several straws together to build stronger “beams”, triangles are nice and stable
- Try to design a structure that evenly distributes weight towards ground
- Building a wide base will help