

THE MARSHMALLOW & TOOTHPICK TOWER CHALLENGE

Materials Needed:

- 1 bag of mini marshmallows (per class or split into small sandwich bags per team)
- 1 box of flat toothpicks (per class or split into portions per team)
- 1 measuring tape or ruler
- 1 timer (displayed on the board)
- Optional: Small paper plates to serve as the building base for each team

Activity Objectives

STEM & Engineering Concepts: Explore spatial reasoning, structural stability, geometric shapes (triangles vs. squares), and balance.

Collaboration & Communication: Practice sharing ideas, taking turns, and listening to teammates.

Resilience & Growth Mindset: Embrace failure as part of the iteration process when structures collapse or lean.



Step-by-Step Lesson Plan

1. Introduction & Mini STEM Concept (5 Minutes)

Gather students and introduce the concept of building strong structures.

Say: "Engineers build tall skyscrapers, bridges, and towers every day. Before we start building, what shapes do you think make a structure super strong? Is a square stronger, or a triangle?"

Quick Demo: Connect three toothpicks into a triangle and four into a square using marshmallows. Show how a square can easily lean or collapse sideways when pressed, while a triangle holds its rigid shape under pressure.

2. Team Setup & Planning Phase (5 Minutes)

Place students into teams of 3 or 4.

Hand out the materials (e.g., 30-40 toothpicks and 25-30 mini marshmallows per group).

The 2-Minute Planning Rule: Before touching any materials, teams must talk for 2 minutes to agree on a plan or base design. No building allowed yet!

3. Building Time (12-15 Minutes)

Start the countdown timer.

Walk around the room to offer encouragement, ask guiding questions, and observe team dynamics.

Teacher Prompts During Building:

"Is your base wide enough to support the height?"

"Where could you add a triangle brace to keep that side from leaning?"

"If a marshmallow is getting squishy, what else could you try?"

4. Testing & Measurement (5 Minutes)

When time is up, call "Hands off!"

Walk around with a measuring tape to test each tower. Remember: the tower must stand unsupported for a full 10-second count!

5. Reflection & Debrief (10 Minutes)

Bring the class together to discuss both the engineering outcomes and the teamwork process.

STEM Reflections:

- "Which geometric shape worked best for keeping towers upright?"
- "What happened if your base was too small?"
- Teambuilding Reflections:
 - "Did your team's original plan work, or did you have to change it mid-build?"
 - "How did your team handle it if part of your tower fell down?"

Adaptations & Extensions

Primary (K-1): Focus on building any stable structure (houses, shapes, bridges) rather than purely competing for height.

Intermediate (2-5) / Weight Challenge: Add a payload challenge! Place a small object (like a lightweight plastic toy or index card) on top of the tower to test load capacity.

Budget Constraint Variant: Assign "prices" to materials (e.g., Toothpicks = \$10 each, Marshmallows = \$5 each) and challenge students to build the tallest tower on a budget!