

Earthquakes

Materials:	Amount per Trial:
Tooth Picks	60
Mini Marshmallows	40
White paper	1
6"x6" Square	1
Shake Table	1 per school

The purpose of this activity is to introduce the engineering method in a hands-on analysis of structure strength and building design. Our goal is to demonstrate how innovation is a process of asking questions, imagining solutions, making plans, testing designs, and most importantly, improving. By asking "how could this be better?" students will be able to point out their mistakes, modify designs, and try again!

White Board Pictures + Planning (~5-10 min)

Discuss 3 structural shapes from last week. With the kids, rank them in order of strongest to weakest.



The square/rectangle can be reinforced with a cross beam, creating 2 triangles.



Have you ever experienced an earthquake?

An earthquake can be paralleled to waves on a beach. Just like those, the ground can experience a similar motion that causes buildings to shake and sway.

How do engineers build buildings that stand through earthquakes?

Earthquake engineers don't just make strong buildings; they make buildings that can wobble very little when the ground shakes. To do this, engineers spend most of their time **planning** their building designs.

What steps will we go through today? This is the engineering method:

ASK: What is the problem?

IMAGINE: What are some solutions? Brainstorm.

PLAN: The most important part. Engineers spend most of their time planning their designs before testing them.

CREATE: Test out your design!

IMPROVE: What could be better? Modify your design and try again!

Part 1 – Planning (~5-10 min)

In pairs, ask students to spend 5 minutes drawing a building on paper. Scouts should help with the designing process and give tips:

- Walls should be reinforced with cross beams (X's) to reduce twisting forces
- Create a wide base. This helps the building resist sliding.
- Connect joints with diagonal bracing.
- Run toothpicks all the way through marshmallows to avoid slipping out.
- Try to make your structure symmetrical so it will not bend in the weakest direction.

Part 2 – Build and Test (~20-30 min)

Scouts should walk around and assist groups.

1. Students will work together in pairs to construct their designs.
2. Test buildings one at a time on the shake table
3. Explain which worked best and why
4. If time permits, allow them to rebuild or improve their structures.

What is the shake table?

The shake table is a basic version of what earthquake engineers use in real life to simulate earthquakes and test the strength of their building designs.