

Shake Table



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STEM-CTE HUB



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Shake Table

The Shake Table Kit challenges students to think like engineers as they design and test structures against simulated earthquakes. Using a crank-powered platform to mimic seismic movement, the learners explore concepts like stability, force, and resilience through hands-on experimentation. It's an exciting way to blend physics, design thinking, and real-world problem-solving while building stronger structures—and stronger minds.



Grade Level

4th - 12th

Group Size

2 - 4 students per group

Time Duration

45 - 60 minutes per design

Content of Kits

Components

- 1 shake table
- variety of Play-Doh
- toothpicks
- bamboo skewers
- duct tape
- binder clips

Consider these for an added challenge

- mini marshmallows (for building joints)
- straws (for structural components)
- spaghetti noodles (for structural components)



Usage

Getting Started

- 1. Introduce Earthquake Engineering –** Begin with a brief explanation or video showing how buildings respond to seismic forces and why testing structures is important.
- 2. Demonstrate the Shake Table –** Show how to operate the hand-cranked shake table and explain how it simulates ground movement.
- 3. Explore Building Materials –** Let students experiment with Play-Doh, toothpicks, bamboo skewers, duct tape, and binder clips to understand how each material behaves.
- 4. Start with Small Builds –** Encourage students to build simple tower structures first to observe how different shapes and reinforcements respond to shaking.

Storage

- **Store Shake Table Flat –** Place the hand-cranked shake table in a secure, flat drawer or cabinet to prevent warping or damage.
- **Keep Materials Separated –** Store Play-Doh in airtight containers to prevent drying out, and separate small items like toothpicks and clips into labeled bins.
- **Bundle Skewers Safely –** Use rubber bands or zip-top bags to store bamboo skewers to avoid injury or bending.

Troubleshooting

- **Structures Collapse Too Early –** Encourage students to test for balance and consider a wider base or bracing techniques using tape and skewers.
- **Shake Table Not Operating Smoothly –** Check for loose parts, clear obstructions from the crank mechanism, and make sure the surface is level.
- **Toothpicks Breaking During Use –** Recommend combining them with skewers or doubling up for added strength in taller structures.
- **Uneven Shaking –** Remind students to crank at a steady speed and ensure the base is firmly placed on a flat surface.



Activity Guide

Beginner

Build a Basic Tower

Students will use Play-Doh and toothpicks to build a simple tower on a base and test it on the shake table. They'll observe how quickly it falls and reflect on how the shape, height, and foundation affect stability. This helps students explore basic design concepts in a low-pressure, hands-on way.

Intermediate

Stronger Structures

Students will build new structures using additional materials like skewers, duct tape, and binder clips to reinforce joints and create triangles, cross-braces, or wider bases. They'll compare their new designs to earlier ones using consistent shake tests and record what worked better. This encourages iteration and introduces real-world earthquake engineering ideas.

Advanced

Design for Duration

Students will work in teams to design a tall structure with at least three levels and test it under varying intensities (light shake, moderate, strong). They'll collect data on how long their design lasts, identify failure points, and adapt their models for improvement. This promotes critical thinking, data collection, and refined engineering design.

Extension Activity:

Shake Zone City

Students will create a cityscape on a large platform with multiple structures from different teams. Each group must build with a unique goal—e.g., the tallest structure, the most flexible, or the one using the least materials. The shake table will simulate an earthquake across the “city,” and students will analyze which designs held up best and why. This blends creativity, collaboration, and applied science in a capstone-style challenge.



Learning Extensions

STEAM Connections: Engineering - Science - Math

Learning Objectives:

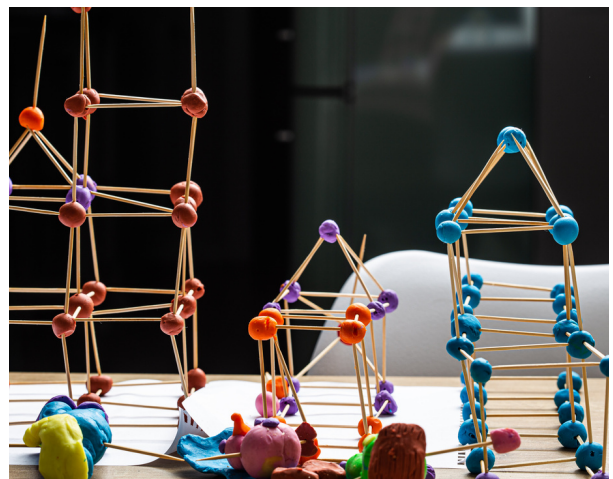
- Understand how different structures respond to seismic forces through hands-on simulation.
- Apply basic engineering design principles to build and test earthquake-resistant structures.
- Analyze structural weaknesses and improve designs through iteration and experimentation.
- Use collaboration and critical thinking to solve real-world challenges related to stability and safety.

Career Connections:

- **Structural Engineer** – Designs buildings and infrastructure to withstand natural forces like earthquakes.
- **Civil Engineer** – Plans and oversees the construction of safe, durable public structures and systems.
- **Architect** – Creates building designs with consideration for stability, materials, and safety regulations.
- **Urban Planner** – Plans city layouts that account for disaster preparedness and structural safety.
- **Disaster Response Specialist** – Works to assess risks and improve community resilience through engineering and planning.

Essential Employability Skills:

- Problem-Solving
- Teamwork
- Collaboration
- Critical Thinking
- Adaptability
- Creativity
- Innovation





Resources and Accessibility

Safety Guidelines

- **Supervise Sharp Materials** – Closely monitor the use of toothpicks, bamboo skewers, and binder clips to prevent accidental pokes or pinches.
- **Handle the Shake Table with Care** – Ensure students use the crank gently and keep fingers clear of moving parts.
- **Keep Workspace Clear** – Maintain a tidy build area to avoid tripping hazards or unintended contact with fragile structures.

Accessibility

- **Provide Adapted Tools** – Offer pre-cut tape strips, larger binder clips, or adapted building tools for students with fine motor challenges.
- **Adjust Table Height** – Place the shake table on adjustable or low surfaces to accommodate students who use wheelchairs or have limited reach.
- **Offer Visual Aids** – Use diagrams, sample structures, or step-by-step guides to support students who benefit from visual learning.
- **Flexible Roles in Group Work** – Let students choose roles such as designer, builder, or observer, depending on their comfort and ability levels.
- **Use High-Contrast Materials** – When possible, provide materials in bold, contrasting colors to support students with visual impairments.

Library Catalog



Library Resources



Feedback

QR to feedback survey

