

# RAFT IDEAS

**Topics:** Earthquakes,  
Plate Tectonics, Richter  
Scale

## Materials List

- ✓ 2 pieces of wood or covers from binders ~30 cm x 30 cm (~12" x 12")
- ✓ 2 large rubber bands
- ✓ 4 rubber balls ~2.5 cm (~1")
- ✓ Small structures to place on the table for testing
- ✓ Optional: 4 caps which will hold rubber balls

Rubber bands and rubber balls may contain Natural Rubber Latex which may cause allergic reactions.

This activity can be used to teach

Next Generation Science Standards:

Earth and Space Science:

- Forecast catastrophic events (Middle School, 3-2)
- Geoscience process on Earth's surface (Middle School, 2-2)

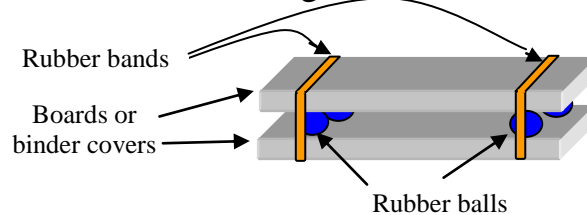
Physical Science:

- Forces & Motion (Grade 3, 2-1 & 2-2)
- Energy - converted (Grade 4, 3-4)
- Waves (Grade 4, 4-1)



# Shake Table

For Testing Structures Built in Earthquake Country



**WARNING: CHOKING HAZARD-** Activity uses a small ball. Not for children under 3 yrs.

Building in earthquake country can be a tricky business. Architects and engineers run simulations using models and shake tables to test the integrity of buildings and determine necessary reinforcements. In this activity, students use a very simple, non-motorized shake table to test their structures.

## Assembly (for teachers or students)

1. Place two boards or binder covers on top of one another.
2. "Rubber Band" the two together by stretching a rubber band around each end, about 2.5 cm (1") from the edge of the boards.
3. Insert the rubber balls between the boards under the rubber bands about 2.5 cm (1") from each edge. If the top or bottom board bows inward, remove the rubber bands, rotate a board 90 degrees, and replace the rubber bands. If that does not work, then move the balls farther from the edge of the board. Optional: place a cap under each ball to keep the balls from rolling away.

## To Do and Notice

1. Use the shake table to model structures during earthquakes. Suggestions:
  - Build structures using toothpicks, wooden cubes, or other materials.
  - Place structures onto a variety of foundations: clay, gelatin, sand.
2. Place the structures on the top surface. Simulate an earthquake by pulling the top surface out of alignment and then releasing it.
3. Note observations and repeat as desired for continued explorations.

## The Science Behind the Activity

Planet Earth is a layered planet, with a dense, metallic core; a layer of hot, liquid rock (mantle); and a cold, brittle surface (crust or lithosphere). The crust of the Earth is broken up into several pieces, known as plates. Convection currents in the liquid mantle pull the plates, causing them to move against one another (plate tectonics). Most earthquakes occur where plates come together (plate boundaries). The state of California spans over 2 plates: the North American plate and the Pacific plate. The state is bisected by a very large and well known "crack", the San Andreas Fault.

Earthquakes are measured by the Richter Scale, a logarithmic measurement system. In this scale, an earthquake of 5.0 represents a tenfold increase in amplitude (and about 31 times more energy released) than a 4.0 earthquake. An earthquake measuring 5.3 would be considered moderate, a 6.3 would be considered strong, and 7.0 or higher is usually considered severe. For historical reference, the 1906 San Francisco earthquake had a magnitude of 7.8, while the 1989 Loma Prieta quake (near Santa Cruz) measured 7.0. Injuries and deaths during earthquakes generally occur because of building or structure collapse or by unsecured objects falling from shelves.

**Web Resources** (Visit [www.raft.net/raft-idea?isid=374](http://www.raft.net/raft-idea?isid=374) for more resources!)

- The USGS has excellent earthquake information -<http://earthquake.usgs.gov/>