

RAFT IDEAS

Topics: Earthquakes,
Plate Tectonics, Structural
Engineering

Materials List

- ✓ CD or DVD jewel case
- ✓ 2 rubber bands
- ✓ 4 rubber balls, ~2.5 cm (~1")
- ✓ Small structures to place on the table for testing

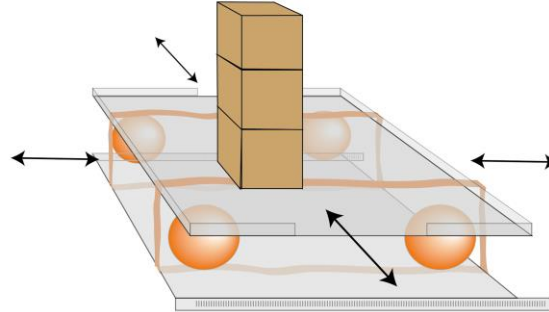
This activity can be used to teach:
Next Generation Science Standards:

- Forecast catastrophic events (Middle School, Earth and Space Science 3-2)
- Geoscience process changing Earth's surface (Middle School, Earth and Space Science 2-2)
- Forces & Motion (Grade 3, Physical Science 2-1 & 2-2)
- Energy can be converted from one form to another (Grade 4, Physical Science 3-4)
- Waves (Grade 4, Physical Science 4-1)



Mini Shake Table

Test model structures by creating mini earthquakes!



Students can use this simple shake table to see how a structure might react to ground movements that resemble those generated by an earthquake.

Assembly

1. Unhinge the cover of a CD jewel case and pry out the insert that held the CD.
2. Place the large, flat sides of the jewel case covers face to face and then stretch two rubber bands around them, ~2.5 cm (1") in from two sides, as shown above.
3. Insert four rubber balls between the jewel case covers, one at each corner.

To Do and Notice

1. Create a structure using paper, wooden cubes, toothpicks, or other materials.
2. Place the structure on the mini shake table to model building on bedrock.
Optional: Model a variety of substrates or foundations by using a container with a layer of soft clay, sand (wet or dry), pebbles, breakfast cereal, or gelatin.
3. Simulate an earthquake by pulling or pushing the top jewel case cover out of alignment with the bottom cover, and then let the top cover spring back.
4. Change a variable such as adding extra mass to the structure's roof, making a taller structure, or adding diagonal reinforcements and then retest.
5. Using longer, or thinner, rubber bands will allow for greater and longer "ground motions" from the shake table. For extended earthquake shaking time, use repeated light tapping of the top cover.

The Science Behind the Activity

The Earth is composed of a dense, metallic core surrounded by a thick layer of hot, liquid rock (the mantle), and covered with a brittle surface crust (lithosphere). The crust is broken up into large pieces called plates. Convection currents in the mantle (hot liquid rock floating toward the crust, cooler liquid rock sinking) move the plates (plate tectonics). Most earthquakes occur where two plates meet (plate boundaries). California is bisected by a large "crack", the San Andreas Fault, where the North American plate and the Pacific plate meet. Movements in a section of a fault generate earthquakes. Earthquakes are made up of four different types of waves; compression (P), shear (S), Rayleigh (R), and Love (L) waves.

Web Resources (Visit www.raft.net/raft-idea?isid=225 for more resources!)

- Descriptions of the 4 waves – <http://www.geo.mtu.edu/UPSeis/waves.html>
- The USGS has excellent earthquake information -<http://earthquake.usgs.gov/>