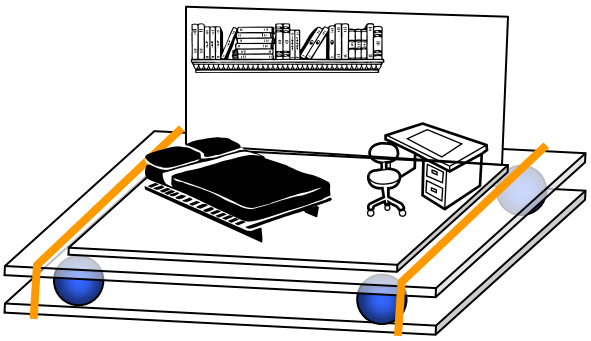
Your Room in an Earthquake

Thinking Ahead for Safety



Explore earthquake safety measures that you can implement at home!

Topics: Earthquakes, Plate Tectonics, Public Safety

Materials

- ✓ Cardboard, cardstock, folders, paper
- ✓ Foam, bottle caps, other plastic objects, containers
- ✓ Pipe cleaners, craft sticks, tissue paper, fabric scraps, beads, other art supplies
- ✓ Scissors
- ✓ Ruler
- ✓ Tape and/or glue
- ✓ Copy of Mercalli Scale, see pg. 2
- ✓ **Optional:** RAFT Shake Table Kit

Learning Standards

NGSS: Earth & Space Science, Earth Systems, Geological Processes, Catastrophic Events; Physical Science, Wave Properties, Forces & Motion

To Do and Notice

1. Measure and cut a 12” square from cardboard or equivalent flat material.
2. Cut and attach 1-4 vertical walls along the edges of the 12” square (see above).
3. Use materials of choice to create a miniature room. Make appropriate miniatures of furniture, small items that might be used for decoration, books, toys, framed pictures, or any other items commonly seen in rooms.
4. Set up the room model as desired.
5. Simulate a small earthquake by gently shaking the cardboard floor. Note any changes in room configuration (items that wobbled, shook, moved, or fell over). **Optional:** Place room model atop an assembled RAFT Shake Table (see above).
6. Repeat the earthquake intensity (low) but shake in the opposite direction. Make note of any changes in room configuration.
7. Slowly increase earthquake intensity, trying small movements over longer periods of time versus larger movements.
8. Use the included Mercalli scale to estimate the intensity of each earthquake.
9. Decide which parts of the model need to be secured, relocated, fastened to walls, etc. Make the necessary changes and retest to minimize damage.
10. What are some simple things that you can change to make your bedroom safer?

The Content Behind the Activity

Earthquakes occur when large-scale rock formations **fracture** and move/shift along a **fault**. Most earthquakes occur where crustal **tectonic plates** come together (plate boundaries). Scientists measure earthquake **magnitude** (energy released) with the **Richter Scale**. Earthquake **intensity** (effect on the Earth’s surface) is measured using the **Mercalli Scale**, a non-mathematical scale with arbitrary rankings. The Mercalli Scale incorporates 12 increasing intensity levels designated by Roman numerals (I to XII). Injuries and deaths during earthquakes generally occur because of building or structure collapse or by unsecured objects falling from shelves or ceilings. Prolonged shaking can cause large objects, like refrigerators and other large appliances, to move across kitchen floors, books to fall from secured shelves, and dishes to tumble from cabinets. You can immediately apply information learned from this activity to make your home more earthquake-safe.

The Mercalli Scale (as presented by the USGS)

I. Not felt except by a very few under especially favorable conditions.

II. Felt only by a few persons at rest, especially on upper floors of buildings.

III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations are like the passing of a truck. Duration estimated.

IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.

V. Felt by nearly everyone; many awakened. Some dishes and windows are broken. Unstable objects overturned. Pendulum clocks may stop.

VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.

VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.

VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage is great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.

IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage is great in substantial buildings, with partial collapse. Buildings shifted off foundations.

X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails are greatly bent.

XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

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