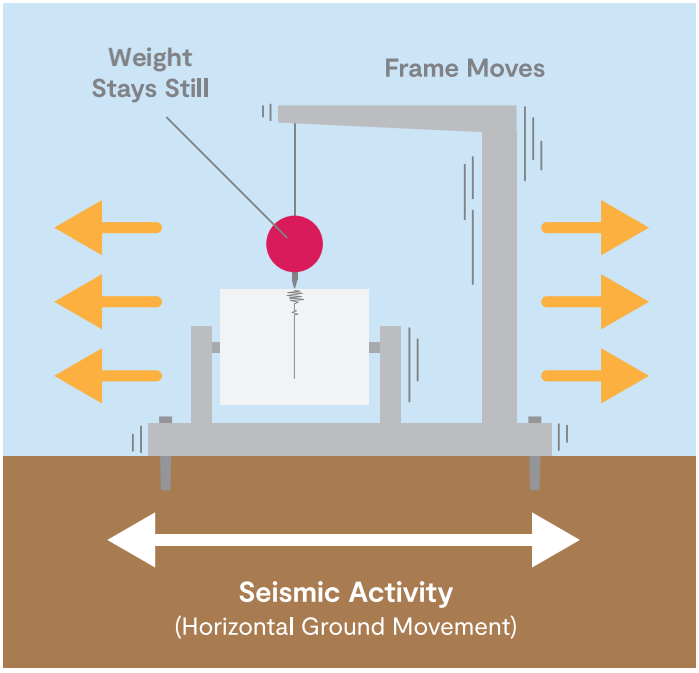
CURIOSITY AT HOME

CAPTURE THE QUAKE

Seismologists are scientists who study the location and force of earthquakes and trace earthquake behavior to interpret the structure of the Earth. One tool they use is a seismograph. This consists of a frame that is rigidly fastened to a body of rock and transmits Earth movements that are felt by the rock. A free-swinging pendulum with an attached writing device records the motion of the pendulum on a seismogram.

Make a seismograph to measure your own home-made earthquakes!



MATERIALS

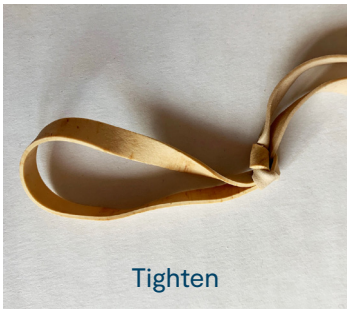
- 7–9 heavy books
- 2 long rubber bands
- Thin line felt tip pen or marker
- Small ball of clay or playdough
- 3 pieces of paper
- Ruler
- Desk or table
- Science notebook or paper
- Something to write with

PROCEDURE

- Stack books in a pile on the desk or table.
- Insert the ruler between the top few books, leaving 2/3 of the ruler sticking out.
- Wrap the ball of clay around the pen near the tip. This will weigh our pen down towards your seismogram.
- Tie one of the rubber bands to the back end of the pen (non-tip side). Then tie second rubber band to the first one creating a rubber band chain. Tie it in such a way that the pen hangs downward from the rubber band with its tip pointed downward.

Tie first rubber band to pen.

Create rubber band chain with second rubber band.



Experiment continued on next page...

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CURIOSITY AT HOME

CAPTURE THE QUAKE

PROCEDURE *continued...*

- Place a paper on the table underneath the ruler to prevent marking up the table.
- Hang the top end of the rubber band chain over the end of the ruler so the tip of the pen just touches the paper on the desk. Add or remove books as needed to adjust the height.
- Adjust the paper so that the top of the paper is just under the tip of the pen.
- Ask an adult, sibling, or friend to sit on the opposite side of the table from you. One of you will hold onto the desk while the other gently and steadily pulls the paper under the pen. What does the seismogram (the pen line on the paper) look like with no earthquakes?
- Now, one person should gently shake the desk, while the other person continues to pull the paper under the pen until the length of the paper runs out. What does the seismogram look like now?
- Change the paper and repeat the experiment two more times, increasing the magnitude (amount of energy released) of the earthquake each time.
- Compare the different seismograms.

TRY THIS

- Try using different materials (blocks, Lincoln Logs, cards, etc.) to build structures. Which can withstand a heavy earthquake?
- Study the waves of each seismogram. Which has the biggest? The smallest? Measure the difference between the top and bottom of your biggest wave.
- While pulling your paper, have someone at a nearby desk drop a heavy book. Was it recorded on your seismogram? How does this happen in real life?

DID YOU KNOW

Seismologists measure the strength of earthquakes on a scale called the Moment Magnitude Scale, or MMS. A larger number on the MMS scale means a stronger earthquake, and a smaller number means a weaker earthquake. Most people will not notice or feel an earthquake measured lower than a 3. The largest earthquake recorded was the Great Chilean Earthquake in 1960: it had a magnitude of 9.5.

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CURIOSITY AT HOME

CAPTURE THE QUAKE

K–2 GRADE EXPLORATION

Here are some questions you can explore together.

- The movement from earthquakes usually lasts around 30-60 seconds. Can you move like an earthquake for 30 seconds? Does this seem like a long amount of time or a short amount of time?
- How would you change the design of your seismograph so it could record more earthquakes?
- How would you change your design to be able to record movement for a full day?

CURIOSITY AT HOME

CAPTURE THE QUAKE

3–5 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- How would you change the design of your seismograph so it could record motion from all directions?
- How can different scientists use a seismograph to learn more about other geological hazards? (volcanoes, landslides, floods, extreme weather, wildfires).
- How would you explain the importance of seismographs to a friend?

CURIOSITY AT HOME

CAPTURE THE QUAKE

6–8 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook

- How would you change the design of a building to make it more earthquake safe?
- How would you explain the importance of seismographs to a friend?
- Go to this United States Geological Survey map: https://earthquake.usgs.gov/earthquakes/map/ It is frequently updated with all recent earthquakes around the world. When was the last time the website was updated?
- Each dot represents an earthquake. Look at the map legend. Why do the dots have different sizes and colors?
- How many earthquakes happened in the United States today? Where are they located?
- Zoom out to view the world. Where was the most recent earthquake located?