

EARTH SCIENCE ACTIVITY #3

All Grades

Fault Hand Models

This activity is one of several in a basic curriculum designed to increase student knowledge about earthquake science and preparedness. The activities can be done at any time in the weeks leading up to the ShakeOut drill. Each activity can be used in classrooms, museums, and other educational settings. They are not sequence-bound, but when used together they provide an overview of earthquake information for children and students of various ages. All activities can be found at www.shakeout.org/schools/resources/.

Please review the content background (page 3) to gain a full understanding of the material conducted in this activity.

OBJECTIVE:

For students to demonstrate three faulting actions using their hands

MATERIALS/RESOURCES NEEDED:

- Transparency of 'Fault Movements' sheet
- Overhead projector

ACTIVITY:

Set-Up (10 minutes)

Print out 'Fault Movements' onto a transparency and move the overhead projector where all the students can view the screen.

Procedure (20 minutes)

The italicized phrases are spoken suggestions for the instructor and those in parenthesis are possible answers students might provide.

1. Start a discussion by asking students where they think earthquakes take place.
Where do you think earthquakes take place? (Answers vary)
Earthquakes may happen near cracks in the Earth called faults. A fault is a crack in rock or soil where movement has taken place. There are two main kinds of movements in which this rock or soil moves- up and down and sideways.
2. Project 'Fault Movements' transparency.
3. Demonstrate the types of faults with hand movements.
I will perform the movements with my hands and I want you to follow along with me.
 - a. Down movement (Normal faulting) – *Right now I will demonstrate down movement. Make your hands into a fist and press the flat edges of the fingers together. Release the pressure and let one of your hands drop just a little. Notice how in down movement, when you released the pressure, one hand moved down while the other remained still.*
 - b. Up movement (Reverse faulting) – *Now you will see up movement. Again, press your knuckles and fingers tightly together as before. Without releasing the pressure, let*

one hand slide up above the other just a little. Notice how in up movement, when you did not release pressure, one hand moved up while the other remained still.

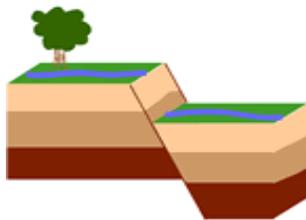
- c. Sideways movement (Lateral, or transform faulting) – *The last type is sideways movement. Straighten your hands and press the sides together. As you release the pressure, slide your two hands past each other in a jerky motion. You will feel vibrations as you do this. If there was a train track going across both hands before moving, what will happen after they have moved? (The tracks will not be aligned.)*
4. Emphasize that the build-up of stress and the sudden slip along the fault result in earthquakes.
Can you see by these hand movements how they can create earthquakes? As the side of the fault press against each other, they move suddenly and create what you feel as an earthquake.
5. As a review, ask students the following questions:
 - a. *What occurs when the faults release the stress build-up? (Earthquakes)*
 - b. *How are earthquakes dangerous? (They can injure people and cause physical damage to buildings and objects)*
 - c. *Why is it important to prepare for earthquakes? (We never know when an earthquake will occur and the best way to reduce earthquake damage is to always be prepared for an earthquake.)*
6. Mention statewide and local awareness programs (such as the ShakeOut) that help communities prepare and practice for such events. For more information, visit shakeout.org.
There are programs such as the ShakeOut that can help us prepare and practice for earthquakes. Has anyone heard of the ShakeOut? (Answers vary)
It is a very important earthquake drill that helps us prepare for future earthquakes.

CONTENT BACKGROUND:

As a result of plate motion, the accumulated stress in the rocks of the lithosphere may cause great warps or folds in rock layers. Where rock is strained beyond its limit, it will fracture, and the rock mass on either side will move abruptly.

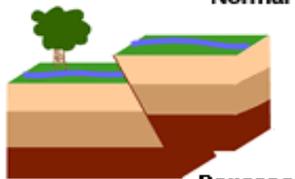
Most earthquakes occur on faults. A **fault** is a thin zone of crushed rock between two blocks of rock, and can be any length, from centimeters to thousands of kilometers. When an earthquake occurs on a fault, the rock on one side of the fault slips with respect to the other. The fault surface can be vertical, horizontal, or at some angle to the surface of the earth.

Vertical fault movement changes the elevation of a rock mass on one side of the fault relative to the rock mass on the opposite side. Fault movement is always stated in relative terms. There are two types of vertical fault movement: normal and reverse. There is also a third type where the fault moves horizontally: strike-slip.



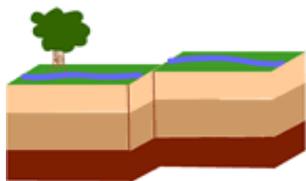
Normal

A **normal fault** is one in which an upper block of rock, separated by a fault from a lower block, moves downward relative to the lower block. Normal faults occur where tectonic plates are moving apart, such as in the Great Rift Valley in Africa.



Reverse

A **reverse fault** is one in which an upper block of rock slides over a lower block which is separated from it by the fault. A low-angle reverse fault is called a thrust fault. An example includes the Himalaya Mountains where the Indian Plate is pushing into the Eurasian Plate.



Strike-slip

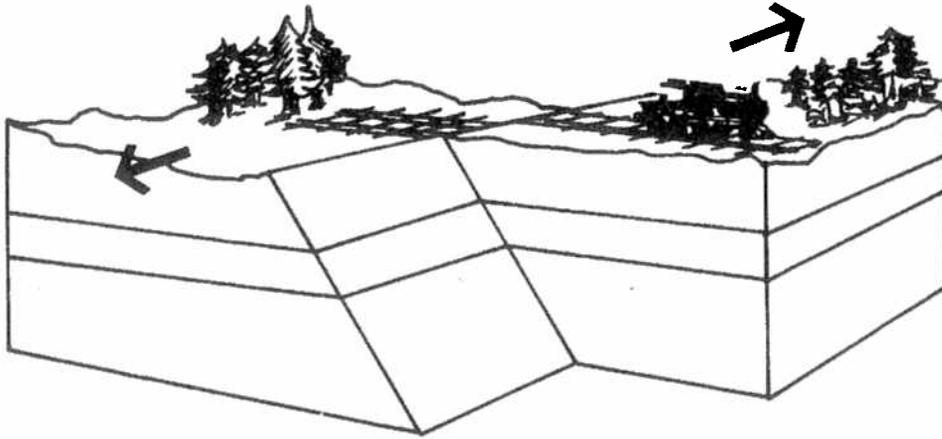
Strike-slip fault is a fault along which motion is mostly in a horizontal direction. This may cause roads and river banks to change their position. The San Andreas Fault in California is a strike-slip fault.

Faults can extend deep into the earth and may or may not extend up to the earth's surface. Faults that do not reach the earth's surface are called "blind thrust faults."

United States Geological Survey. (2009). Fault. In Earthquake Glossary. Image retrieved from <http://earthquake.usgs.gov/learn/glossary/?term=fault>

Fault Movements

Horizontal Fault Movement



Vertical Fault Movement

