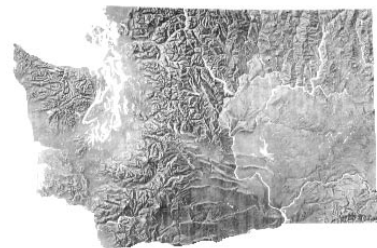


# EARTH CONNECTIONS

## Resources For Teaching Earth Science



### SIMPLE HOME EXPERIMENTS FOR BRINGING GEOLOGY TO LIFE

#### EXPERIMENT 1: SHAKE, RATTLE, AND LIQUEFY

**BACKGROUND:** When sediments liquefy, they lose their structure and strength. During earthquake shaking, the individual grains of sand within a deposit collapse on each other. Anything built on them can sink or collapse. Picture a container of balls of slightly different sizes—baseballs, golfballs, marbles. If they were transported by water into the container and then deposited, they would settle with spaces between them. Some of the spaces would be filled with water, some with air. When you shake the container, the balls settle against each other, and the water and air are forced to the surface. That is exactly what happens in a sediment-filled valley. The valley is a large ‘container’ holding gazillions of ‘balls’ or grains of sand. Shaking the container simulates an earthquake.

#### EQUIPMENT NEEDED:

- ✓ Transparent (glass) baking pan
- ✓ Enough dry sand to fill your pan 1 to 2 inches
- ✓ A few toy houses or wooden blocks
- ✓ Water

**PURPOSE:** We know that flat river valley bottoms are prone to flooding, but we often think of them as being geologically stable. This experiment will teach you what happens to sandy soils when they liquefy. It will show you how to create a ‘model’ river valley, then watch how and why houses get damaged or collapse during an earthquake in a seemingly stable geologic environment.

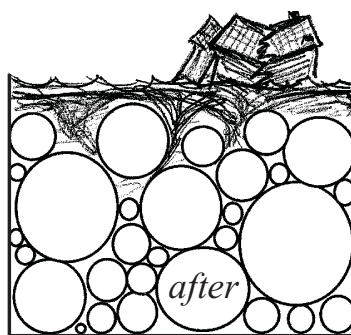
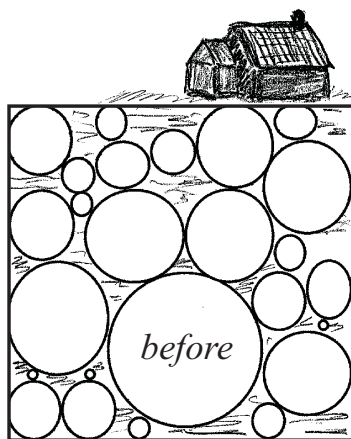
#### PROCEDURE:

- 1 Evenly pour the dry sand into the baking pan.
- 2 Mark the level of the sand on the side of the pan.
- 3 Place the houses or blocks gently on the surface.
- 4 Slowly add water until about two-thirds of the thickness of the sand is saturated.
- 5 Gently start shaking the table on which you have placed your baking pan (or the pan itself).

#### OBSERVATIONS: You should see the following:

- ✓ The water will work its way to the surface, flooding the area around the houses,
- ✓ The houses will start leaning over and sinking into the sand, and
- ✓ The volume of the sand should decrease by a small amount.

**EXPANDED ACTIVITY:** Now be creative. Try the experiment using clay or gravel to separate sand layers and represent different types of sedimentary layers. Watch what happens to the water and the surface of your model of a river valley.



#### ESSENTIAL SCIENCE LEARNING BENCHMARKS

1.3 Students will understand that interactions within and among systems cause changes in matter and energy.

2.2 Students will also apply science knowledge and skills to solve problems or meet challenges.

#### GRADE LEVELS

6th–10th grades

#### SUBJECTS

Earth science  
Liquefaction  
Earthquakes

#### CONCEPT

How different soils react during an earthquake.

#### SKILLS

Observing, comparing and contrasting, and identifying relationships.

#### OBJECTIVE

Students will test soils’ reaction to ground shaking representing an earthquake.

#### TIME NEEDED

60 minutes or less

#### DISCUSSION

1. Compare what happens to the water when using different soils; describe what happens between water and soil for each type tested.
2. How would these differing soils affect human development, such as structures or houses?
3. How can people plan for earthquakes when considering a new building location?
4. How can people plan for earthquakes if their houses are already in hazardous places?
5. How can people find out if their houses are in hazardous places? (Contact the Washington Division of Geology and Earth Resources.)

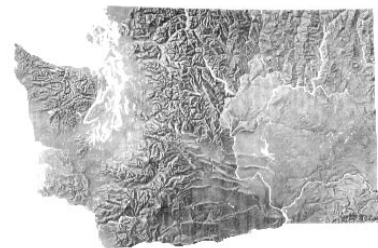
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**Earth Connections No. 2**

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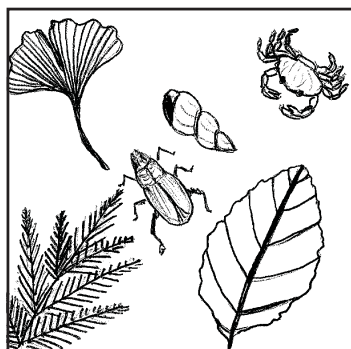
### SIMPLE HOME EXPERIMENTS FOR BRINGING GEOLOGY TO LIFE

#### EXPERIMENT 2: CONDENSING GEOLOGIC TIME OR THE ART AND SCIENCE OF MAKING FOSSILS

**BACKGROUND:** Finding plants, animals, and even early humans buried in the geologic strata gives us clues to what our planet Earth was like in the past.

##### EQUIPMENT NEEDED:

- ✓ Small oven-proof dish or pan
- ✓ Clay, local, natural source if you're lucky, otherwise play-dough or modeling clay will work (No oil-base clays! They will burn in the oven.)
- ✓ Leaves, *empty* shells, dead bugs, etc.
- ✓ Sand



**PURPOSE:** This experiment will teach you about the process of fossil burial, preservation, and discovery. It will give you the opportunity to think about the types of things (or specimens) one finds buried in sediment, about the sediments and processes that preserve these specimens as fossils, and about *TIME*.

##### PROCEDURE:

- 1 Layer the bottom of your dish with about one-half inch of the clay.
- 2 Explore your backyard or a nearby beach and find things that might become fossilized if they were to be buried for a few million years, making sure that whatever you pick up is no longer alive!
- 3 Next, press your finds gently into the clay.
- 4 Then, cover this layer of fossils-to-be with a thin layer of sand. This is so your clay layers will part easily after you 'bake' your fossils.
- 5 Carefully add another layer (or geologic stratum) of clay to your sample. You are now ready to dry your sediments with the buried 'fossils'.
- 6 **MAKE SURE YOU WORK WITH AN ADULT FOR THIS NEXT STEP.** Put the dish in an oven on very low heat. You want to dry your sample slowly so it doesn't crack. This might take an hour or more depending on how wet the clay was.
- 7 When the sample looks dry, **VERY GENTLY** remove it from the dish and pry it apart at the sand layer.

**OBSERVATIONS:** You should be able to see:

- ✓ Your 'fossil' specimens,
- ✓ The impressions made in the upper and lower clay surfaces, and
- ✓ How the sample broke along the sand layer.

**EXPANDED ACTIVITY:** Find a book about fossils at your library and look up the difference between 'casts' and 'molds' and see if you can identify each in your sample.

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#### ESSENTIAL SCIENCE LEARNING BENCHMARKS

1.1 Students will use properties to identify, describe, and categorize substances, materials, and objects, and use characteristics to categorize living things.

#### GRADE LEVELS

4th–8th grades

#### SUBJECTS

Earth science  
Geologic time  
Fossils

#### CONCEPT

What geologic conditions lead to the formation of fossils.

#### SKILLS

Observing, analyzing, classifying, and identifying relationships and patterns.

#### OBJECTIVE

Students will simulate the making of fossils.

#### TIME NEEDED

90 minutes

#### DISCUSSION

1. Why was it important to have the sand layer (sand stratum) between the layers of clay?
2. What are some processes that create fossils?
3. What sorts of fossils have you seen in a museum or collected yourself?
4. Think about how long it took you to make your 'fossils'. How does that relate to *GEOLOGIC TIME*.

ALL OUR SCIENCE,  
MEASURED AGAINST  
REALITY, IS PRIMITIVE  
AND CHILDLIKE—AND YET  
IT IS THE MOST PRECIOUS  
THING WE HAVE.

*Albert Einstein (1879–1955)*

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