

Name: Victoria Woodward

Grade: 4th

Title: What Happens During An Earthquake?

GLEs Addressed

- Science Content GLE- [4] SD2.2 The student demonstrates an understanding of the forces that shape Earth by identifying causes (i.e., earthquakes, tsunamis, volcanoes, landslides, and avalanches) of rapid changes of the surface.
- Science Process GLE- [4] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring and communicating.
- Writing GLE [4]2.2.2 The student writes for a variety of purposes and audiences by: writing in a variety of nonfiction forms using appropriate information and structure (i.e., personal letters, recounts, descriptions or observations).
- Cultural Standard D4. Culturally-knowledgeable students are able to engage effectively in learning activities that are based on traditional ways of knowing and learning. Students who meet this cultural standard are able to gather oral and written history information from the local community and provide an appropriate interpretation of its cultural meaning and significance;

Science Concept: Earth's surface can be changed during an earthquake.

*****The scoring guide and assessment task are located at the end of the lesson. Please share them with your students before beginning the lesson.**

Materials

- 1 hardboiled egg
- 1 large tablecloth or sheet (the thinner the better)
- Wooden blocks to build structures for model
- Miniature buildings, trees, animals, cars (optional)
- 1 small index card with the word "anchor"
- 1 small index card with the word "tremor"
- Science journals- one per student
- List of Elders names/phone numbers for interview
- Picture(s) of aftermath from March 27, 1964 Great Alaska Earthquake from website: <http://www.johnmartin.com> John A Martin & Associates, 2009.
- My Earthquake Adventure Assessment Worksheet
- Earthquake Disaster Worksheet
- Elder Interview Worksheet

Resources:

- American Heritage Dictionary 4th Ed. 2001. Pp 205, 765, 779, 940.

- Are Mountains Growing Taller? Berger, Melvin and Gilda. 2002, Scholastic, New York.
- Disasters! Background Information, Activities, and Projects to Teach About Earthquakes, Hurricanes, Volcanoes, and Other Forces of Nature, Conklin, Tom. 2000, Scholastic, New York. P 62.
- Houghton Mifflin Dictionary. 2001. Pp 94, 726, 694.
- Houghton Mifflin Science. 2007. Boston, MA. H32 Glossary.
- Earthquakes, Trueit, Trudi Strain. 2003. Franklin Watts, a Division of Scholastic Inc. New York.
- <http://www.johnmartin.com> John A. Martin & Associates, 2009. Images of earthquakes.

Vocabulary

- **Earthquake** (vibrations that generate energy in the form of seismic waves caused by rock fracturing within Earth's crust). Earthquakes Trudi Strain Trueit. 2003. P 51.
- **Buckle** (to bend, bulge, or crumple under pressure or heat). Houghton Mifflin Dictionary. 1986. P 94.
- **Crack** (a partial split or break; fissure). American Heritage Dictionary 4th Ed. 2001. P 205.
- **Fault** (a fracture in Earth's crust along which two pieces of crust meet). Earthquakes. Trudi Strain Trueit. 2003. P 51.
- **Pressure** (a strong force that pushes on something). Are Mountains Growing Taller? Melvin and Gilda Berger. 2002. P 49.
- **Shift** (to move or transfer from one place or position to another). American Heritage Dictionary 4th Ed. 2001. P 765.
- **Slide** (to move over a surface while maintaining continuous contact). American Heritage Dictionary 4th Ed. 2001. P 779.
- **Split** (to break, burst, or rip apart with force). Houghton Mifflin Dictionary. 1986. P 694.
- **Sway** (to swing or cause to swing back and forth or from side to side. Houghton Mifflin Dictionary. 1986 p. 726.
- **Vibrate** (to move back and forth quickly). Houghton Mifflin Science. 2007. H32Glossary.
- **Wrinkle** (a small furrow, ridge, or crease on a normally smooth surface, as cloth or the skin). American Heritage Dictionary 4th Ed. 2001. P 940.

Gear Up Process Skills: observing, inferring, communicating, predicting

•Ask students: How might the surface of Earth change during an earthquake? List student responses on the board.

•Start the activity by asking students to predict what they think causes the destruction or damage to the surface of Earth. Put student responses on the board or chart paper. Use a hard boiled egg to explain Earth's basic structure. Tell students that the crust of the Earth is like the shell of an egg. The crust is not intact, however. The cracks in the crust are called fault lines, which are constantly grinding up against each other. That energy builds up as the huge plates lock together. When they finally shift, great amounts of energy are released which brings about earthquakes.

•Then do the following **Finger Snapping Activity** to demonstrate the concept:

Tell students that the surfaces of their thumbs and fingers are like the edges of fault lines. Ask students to describe what they feel as they apply pressure between their thumbs and fingers (friction causes energy to build between the digits). Ask students to imagine a similar buildup of energy, many billion times greater, between the huge plates of the Earth's crust along the fault lines.

•Review or introduce the vocabulary words.

Explore **Process Skills:** observing, predicting, developing models

Have students clear their desks or tables of everything except their science journals, pencils, and Earthquake Disaster Worksheet. Put students into groups of four. Tell students that they will be exploring what happens to the Earth's surface during an earthquake.

- Step 1: Ask students to predict what will happen to a town or city if there is an earthquake and record the predictions in their journal.
- Step 2: Have students follow directions on the Earthquake Disaster Worksheet after reviewing the worksheet with the group.
- Step 3: Ask the following questions after students have completed the investigation and recorded observations in their journals.
 - What happens to the crust? (sheet)
 - What happens to the buildings? (wooden blocks)
 - Did the trembling (tremor) or swaying movement of Earth's surface cause more damage? Explain why.

Generalize **Process Skills:** communicating, predicting, inferring, describing, classifying

Ask the whole class the following questions:

- How can Earth's surface be changed during an earthquake?
- How would the roads, buildings, and coastline change in our town if we had a large earthquake?
- What other things that might change?
- What would things stay the same? Or would anything stay the same?
- What problems people would we have in our community with communication, driving, getting groceries, or getting to and from school?
- What could you do as a student to help the community with these problems?
- What could be put in a community brochure about earthquake safety preparedness to send home?

Apply **Process Skills:** inferring, describing, making generalizations

In your science journal describe and illustrate your observations about a picture of the Great Alaskan Earthquake of March 27, 1964. Write about how Earth's surface was changed during the earthquake. Also list two or more questions you could investigate regarding the destruction that takes place after an earthquake.

Scoring Guide

| GLE/Standard | Level 1 Below Proficient | Level 2 Proficient | Level 3 Above Proficient |
|----------------------------------|---|---|---|
| Science Content GLE [4] SD2.2 | Student identifies fewer than two changes in the surface of Earth due to an earthquake. | Student identifies two changes in the surface of Earth due to an earthquake. | Student identifies more than two changes in the surface of Earth due to an earthquake. |
| Science Process GLE [4] SA1.1 | Student makes fewer than two inferences about an earthquake changing the surface of the Earth. | Student makes two inferences about an earthquake changing the surface of the Earth. | Student makes more than two inferences about an earthquake changing the surface of the Earth. |
| Writing GLE W [4] 1.2.2 | In one paragraph students describe how an earthquake changes the surface of Earth. | In two paragraphs students describe how an earthquake changes the surface of Earth. | In three or more paragraphs students describe how an earthquake changes the surface of Earth. |
| Cultural Standard D4 | Student develops fewer than two questions for an interview and/or does not interview an Elder who has experienced an earthquake event | Student develops two questions to ask an Elder and interviews an Elder who has experienced an earthquake event. | Student develops three or more questions to ask an Elder and interviews an Elder who has experienced an earthquake event. |

Assessment Task

1. Students are given the worksheet: My Earthquake Adventure Assessment to complete.
2. You will use the Elder Interview Worksheet and develop at least two more questions to ask an Elder who has experienced an earthquake event. Then you will interview a local Elder using the questions the worksheet.

Earthquake Disaster Worksheet

What happens to the earth's surface during an earthquake? Let's do an investigation to find out.

Materials Needed:

- A sheet or tablecloth (the thinner the fabric the better)
- Wooden blocks
- Index card with the word anchor
- Index card with the word tremor
- 4 students to a group (an anchor, a tremor, observer, and recorder)

STEP ONE- What happens to the Earth's surface during an earthquake? Record your observations during this investigation.

STEP TWO- Spread the sheet across the surface of the table. The fabric is the Earth's Crust. The table is the Earth's mantle. Next, build houses from wooden blocks near one end of the sheet.

STEP THREE- Work with your partners. One of you is the "anchor." The anchor holds down the corners of the sheet nearest your buildings. The other one is the "tremor." The tremor goes to the other end of the table and grasps the corners of the sheet and gently tugs the corners of the sheet in order to cause it to move or vibrate back and forth. What happens to the surface of the earth? What happens to your buildings? Carefully record your observations in a science journal. Then repair any damaged buildings by restacking the wooden blocks.

STEP FOUR- Trade places with your partner. The "tremor" of the first investigation is now the "anchor" and vice versa. The tremor carefully lifts the far corners of the sheet about 18 inches off the table, and then pulls them back down to the surface. What happens to the surface of the Earth? What happens to your buildings? Carefully record your observations in a science journal.

Elder Interview of an Earthquake Event

My name_____

Elder's name being interviewed_____

Elder's mailing address_____

Today's Date_____

Ask your Elder the following questions:

1. What earthquake event have you experienced?
2. Please describe what happened.
3. What happened to your house?
4. What happened to the yard around your house?
5. How was Earth's surface changed after the earthquake?
6. Where were you when the earthquake struck on *Good Friday, March 27, 1964*?
7. Two or more questions you developed to ask the Elder (use the back of the back if necessary).

Remember to send the Elder a Thank You letter

My Earthquake Adventure Assessment

Name:

Date:

Imagine you have experienced an earthquake. Write two or more paragraphs that describe and identify two or more changes in Earth's surface when an earthquake occurs. Also make two or more inferences about Earth's surface due to an earthquake.