

Destruction Hits: A Closer Look at Volcanoes and Earthquakes in Japan



Background Information

Japan lies along the Pacific **Ring of Fire** a narrow zone around the Pacific Ocean where a large chunk of Earth's earthquakes and volcanic eruptions occur. The **Ring of Fire** is a **ring** of volcanoes around the **Pacific** Ocean that result from subduction of oceanic plates beneath lighter continental plates. Most of the Earth's volcanoes are located around the **Pacific Ring of Fire** because that the location of most of the Earth's subduction zones. Volcanoes, earthquakes, and tsunamis appear **around** the boundaries of the several, fast moving, tectonic plates that make up this region. When the plates collide, they create areas of volatility.



Overview

Students will learn the location of the Pacific Ring of Fire and will explore other landforms within that area. Students will have a better understanding of how volcanoes can change the Earth's surface and how these effects can cause other forms of destruction such as tsunamis and earthquakes. Students will build a model of land and will create earthquake motions to see the effects it can cause. Students will also be able to review the process of Weathering, Erosion, and Deposition.

Education Standards

TEKS 5.7 (a) Earth and Space

The student knows Earth's surface is constantly changing and consists of useful resources.

- (a) explore the processes that led to the formation of sedimentary rocks and fossil fuels
- (b) recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, and ice

This lesson will also support past skills of:

3.7B Investigate rapid changes in Earth's surface such as volcanic eruptions, earthquakes, and landslides. (this TEK will also be tested on the 5th grade STAAR test)

English Language Proficiency Standards (ELPS)

1A Use prior knowledge and experiences to understand meanings in English.

1E Internalize new basic and academic language by using and reusing it in meaningful ways in speaking and writing activities that build concept and language attainment.

2C Learn new language structures, expressions, and basic and academic vocabulary heard during classroom instruction and interactions.

3DE Speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency AND share information in cooperative interactions.



Materials Needed

- 1 Piece of cardstock, cut into halves (per group)
- ½ cup moist sand (per group)
- 1 Measuring cup (per teacher)
- 1 Plastic bag, snack or sandwich size (per group)
- 1 Tray or tub (per group)
- 1 Goggles (per student)

Vocabulary

Pacific Ring of Fire a large area with active Volcanoes

Earthquake a violent shaking of the Earth that occurs when two tectonic plates bump into each other

Tsunami a larger tidal wave caused by an earthquake

Volcano a rupture in the Earth's crust where molten lava, hot ash, and gases from below escape into the air.

Student Objectives

Students will be able to

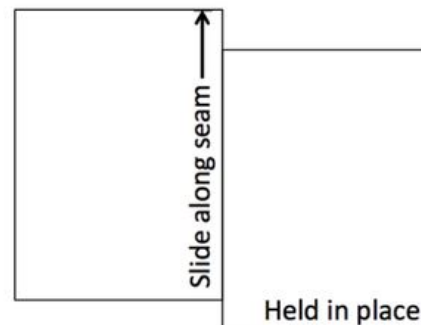
1. learn what the Ring of Fire is and where it is located.
2. understand the relationship between a volcano, earthquake and tsunami.
3. to develop a basic understanding of the movement of the Earth's crust surface during an earthquake and the effect it has on surface features.
4. manipulate a model of land by shaking/shifting the plates to create an earthquake
5. Observe the effects an earthquake, a volcano and a tsunami has on the Earth's surface
6. Discuss how these effects can cause erosion and deposition.

Activity

Preparation

Cut pieces of cardstock in half, such that each group receives two halves. Prepare cup of moist sand and place in plastic bags for each group. It will be helpful to prepare a model set up so that student know how to begin the activity. Lay the two pieces of cardstock side by side so that they slightly overlap at the middle seam. Place cup of moist sand directly over the seam and pat it down so that it forms a smooth mound. The sand does not need to cover the entire seam. If time is available, you can extend the activity by having each group take a picture of the model, “before and “after.

1. The teacher will explain that Japan is known for high volcanic activity. Using a map, the teacher will show the students where the Ring of Fire is located. Brainstorm other rapid changes that might occur on Earth’s surface. **Examples might include earthquakes, tornadoes, tsunamis, and hurricanes.**
2. The teacher will show the powerpoint about Volcanoes, Earthquakes and Tsunamis.
3. Discuss the relationship between a volcano, earthquake and tsunami from the slide show. Students can also watch this Youtube video to make a connection between volcanoes, earthquakes, and tsunamis. <https://youtu.be/t7MZt35fXv4> (only if time permits)
4. Provide each group with the two halves of cardstock, sand, and a tray or tub. Direct students to lay the two pieces of cardstock on the tray next to each other so that the edges slightly overlap at the seam in the middle. Instruct students to place the sand on top of the cardstock directly over the seam and pat it in place so that the surface of the sand is smooth. The sand should not cover the entire surface of the cardstock. Students should create a simple, smooth mound across the middle seam.
5. Discuss: What does the smooth sand model? **Earth’s surface.**
6. Direct students to work as a team. One student holds one piece of cardstock in place. A second student gently pulls the other piece so that it slides along the seam until a change in the sand is observed, about 1-2 cm. (see diagram).



6. Students will take turns shifting the “tectonic plates” - sliding the pieces side by side to create an earthquake.

7. Students can change it up and move their cardstock pieces according to the diagrams below, to resemble spreading, subduction, and lateral sliding.

Type of Margin	Divergent	Convergent	Transform
Motion	Spreading	Subduction	Lateral sliding
Effect	Constructive (oceanic lithosphere created)	Destructive (oceanic lithosphere destroyed)	Conservative (lithosphere neither created or destroyed)
Topography	Ridge/Rift	Trench	No major effect
Volcanic activity?	Yes	Yes	No

Extension

Students can create lego buildings to test how long their building could withstand the shaking of an earthquake. Students can also think of ways to create a model of a tsunami. Have students research how tsunamis happen and have them create a model using cardboard, sand and a shallow pan of water.

