Volcanoes Shake and Bake

Indoor Activity

Time Commitment: 45 minutes to 1 hour
Trail: The Eruption Trail
Location: Johnston Ridge Observatory

Students use information from the exhibits inside Johnston Ridge Observatory to complete an activity sheet. If your class does not have a full 45 minutes to complete the activity, you may simply omit an appropriate portion to fit your time constraints or assign a concluding question to be done as a post-trip activity. The activity is divided into sections. The exhibit where students can find information for each activity is at the top of each section. Students can do the sections in any order they choose as long as they answer the concluding question last.

Goal:

1) The student will understand how mountains continue to grow and change.

Objectives:

1) The student will be able to identify the 1980 eruptive events of Mount St. Helens.
2) The student will be able to discern how those events had or are continuing to affect this mountain.
3) The student will be able to make defendable predictions of the future of Mount St. Helens.

Washington Essential Academic Learning Requirements

1.1.5 Nature and Properties of Earth Materials
Understand physical properties of Earth materials including rocks, soil, water and air.

- Describe and sort rocks based on physical properties.

1.2.1 Structure of Physical Earth/Space and Living Systems
Analyze how the parts of a system go together and how these parts depend on each other.

- Identify parts of a system and how the parts go together.

1.2.4 Components and Patterns of Earth Systems
Understand the Earth's systems include a mostly solid interior, landforms, bodies of water, and an atmosphere.

- Identify and describe various landmasses, bodies of water, and landforms.

1.3.1 Nature of Force
Understand forces in terms of strength and direction.

- Compare the strength of one force to the strength of another force.

1.3.2 Forces to Explain Motion
Understand how balanced and unbalanced forces can change the motion of objects.

- Investigate and report how the position and motion of objects can be changed by a force.

1.3.3 Conservation of Matter and Energy
Understand that a substance remains the same substance when changing state. Understand that two or more substances can react to become new substances.

- Observe and describe how a substance is the same substance before and after heating and cooling.

1.3.4 Processes and Interactions in the Earth's system
Know processes that change the surface of the Earth.

- Describe how earthquakes, landslides, and volcanic eruptions change the surface of the Earth.

2.1.3 Limitations of Science and Technology
Understand how to construct a reasonable explanation using evidence.

- Generate a scientific conclusion including supporting data from an investigation.
- Describe a reason for a given conclusion using evidence from an investigation. Generate a scientific explanation of observed phenomena using given data.

2.2.5 Evolution of Scientific Ideas
Understand that scientific comprehension of systems increases through inquiry.

- Describe how scientific inquiry results in facts, unexpected findings, ideas, evidence, and explanations.
- Describe how results of scientific inquiry may change our understanding of the systems of the natural and constructed world.

Volcanoes Shake and Bake **Name:** _____

Directions: Answer the questions in complete sentences as you explore the visitor center. Each exhibit will provide evidence about how Mount St. Helens builds up and breaks down through volcanic eruptions.

Go to the **theater hallway,** and find the picture of Mount St. Helens before it erupted in 1980. Draw the picture of the volcano.

Find the exhibit '**There are Different Recipes for Eruption**'. How do Hawaiian volcanoes differ from Mount St. Helens? _____

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How do Hawaiian lava rocks differ from Mount St. Helens lava rocks?

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Find the '**model of Mount St. Helens with colored lights'**. Listen to the description of the eruption and fill in the chart below.

List the eruptive events in the order they took place.	How did this eruptive event change Mount St. Helens or the landscape?
#1	
#2	
#3	
#4	
#5	
#6	

Find the **big black and white picture of Mount St. Helens.** Watch the videos on the 1980-86 lava dome and 2004-2008 lava dome. How were these eruptions different from the May 18, 1980 eruption?

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Explain how the lava domes changed the crater of Mount St. Helens.

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Find the '**Seismic Signatures'** Exhibits:

What does a seismograph record? _____

How is a seismograph like a signature? _____

_____

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Feel an earthquake then sketch and label a seismic signature you learned about.

How do earthquakes help scientists predict eruptions? _____

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Now try to recreate the seismic signature you have drawn on the **Make-A-Quake** exhibit. Describe the motions you had to make to recreate your signature (bounce, bend your knees, stomp or jump)? _____

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Find the exhibit '**When Will It Erupt?**' and watch the '**Deformation**' video. Explain how magma can change the shape of Mount St. Helens.

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Watch the '**Remote Cameras**' video. Why are remote cameras helpful when monitoring a volcano?_____

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Find the exhibit '**New Answers to Old Mysteries**'. What two eruptive events at Mount St. Helens led to the discovery of similar events at other volcanoes?

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Describe how Mount St. Helens was changed by the May 18, 1980 eruption, 1980-86 eruptions, and 2004-2008 eruption.

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Answer Sheet to Volcanoes Shake and Bake

Directions: Answer the questions in complete sentences as you explore the visitor center. Each exhibit will provide evidence about how Mount St. Helens builds up and breaks down through volcanic eruptions.

Go to the **theater hallway,** and find the picture of Mount St. Helens before it erupted in 1980. Draw the picture of the volcano.

Find the exhibit '**There are Different Recipes for Eruption**'. How do Hawaiian volcanoes differ from Mount St. Helens? *Hawaiian volcanoes are shield volcanoes. These gently-sloped volcanoes are the result of layer after layer of thin fast-flowing basalt lava. Mount St. Helens is a composite or strato volcano. These steep-sloped volcanoes can erupt lava flows, build lava domes, and explode violently. Layers of ash and lava make composite volcanoes much like big volcanic junk piles.*

How do Hawaiian lava rocks differ from Mount St. Helens lava rocks?

Hawaiian lava rocks are much darker than Mount St. Helens lava rocks because they contain more iron minerals and less silica. The amount of silica plays a critical role in determining how a volcano will erupt.

Find the '**model of Mount St. Helens with colored lights'**. Listen to the description of the eruption and fill in the chart below.

List the eruptive events in the order they took place.	How did this eruptive event change Mount St. Helens or the landscape?
#1 Landslide	*The crater formed largely due to the landslide. 90% of what is now missing fell off the mountain in the landslide. It changed the Toutle River Valley by filling it with hundreds of feet of rock, and by creating Coldwater and Castle Lakes. It also doubled the size of Spirit Lake.*
#2 Lateral Blast	*The lateral blast changed the mountain by helping remove the north side of the volcano. It changed 234 square miles of forestland by shattering and blowing down the forest, and covering the landscape with rock and ash.*
#3 Ash Plume	*The ash plume changed the greatest area. The plume covered 22,000 square miles of land with ash. Street lights turned on in the morning because the ash plume darkened the sky.*
#4 Mudflows	*Mudflows destroyed houses, bridges and clogged river valleys with gooey mud and rock.*
#5 Pyroclastic Flows	*Pyroclastic flows raised the valley floor by covering the landscape with pumice and ash.*
#6 Lava Dome Building	*The volcano rebuilds itself by forming domes of lava—big mounds of lava too sticky to flow.*

Find the **big black and white picture of Mount St. Helens.** Watch the videos on the 1980-86 lava dome and 2004-2008 lava dome. How were these eruptions different from the May 18, 1980 eruption? *The 1980-86 and 2004-2008 eruptions were non-explosive. Stiff, pasty dacite lava slowly oozed up on to the surface of the crater floor. When dacite lava lacks gas, it cannot explode violently and it is too thick to flow very far. The May 18, 1980 eruption was explosive and changed the landscape with violent force. The dacite lava erupted on May 18, 1980 was gas-rich, which caused it to pressurize and explode.*

Explain how the lava domes changed the crater of Mount St. Helens.
The 1980-86 and 2004-2008 lava dome-building eruptions filled the crater with two massive mounds of rock called lava domes. The 2004-2008 lava dome also pushed the crater glacier around the 1980-86 lava dome onto the north side of the crater floor.

Find the '**Seismic Signatures'** Exhibits:
What does a seismograph record? *Earthquakes and other events that cause the ground to vibrate*
How is a seismograph like a signature? *People have different signatures when they write. We can learn to identify who wrote something by identifying their signature or writing style. Many different kinds of events can make the ground vibrate. We can learn to identify the signature of earthquakes and other events that make the ground vibrate.*

Feel an earthquake then sketch and label a seismic signature you learned about.
There are a variety of answers to this question

How do earthquakes help scientists predict eruptions? *One warning signal volcanoes provide before they erupt is increased earthquake activity. As magma pushes up into the volcano, it fractures rock inside the volcano. The number, magnitude and depth at which earthquakes are recorded help scientists understand how close to the surface the magma has risen.*

Now try to recreate the seismic signature you have drawn on the **Make-A-Quake** exhibit. Describe the motions you had to make to recreate your signature (bounce, bend your knees, stomp or jump)? *There are a variety of answers to this question*

Find the exhibit '**When Will It Erupt?**' and watch the '**Deformation**' video. Explain how magma can change the shape of Mount St. Helens. *When magma rises into a volcano it changes the shape of the volcano. It can make the surface swell or inflate, subside or deflate, or tilt. Deformation provides important clues about where and how much magma is rising into a volcano.*

Watch the '**Remote Cameras**' video. Why are remote cameras helpful when monitoring a volcano? *Remote cameras allow geologists to safely observe changes 24 hours a day, seven days a week. They also help geologists correlate seismic events with the processes that created them*

Find the exhibit '**New Answers to Old Mysteries**'. What two eruptive events at Mount St. Helens led to the discovery of similar events at other volcanoes?

The May 18, 1980 landslide and lateral blast enabled scientists to discover landslide deposits (hummocks) and horseshoe-shaped craters created by lateral blasts throughout the world.

Conclusion:

Describe how Mount St. Helens was changed by the May 18, 1980 eruption, 1980-86 eruptions, and 2004-2008 eruption.

The May 18, 1980 eruption was explosive and destructive. It removed the summit and north side of the volcano, creating a horse-shoe-shaped crater. The volcano was cone-shaped before the eruption and was covered with snow and ice. The volcano now has a large horseshoe-shaped crater and is much shorter. There is also much less snow and ice. The 1980-86 and 2004-2008 lava dome-building eruptions were non-explosive. These eruptions were constructive. The two domes have replaced about 4% of what was lost on May 18, 1980.