



Mount St Helens National Volcanic Monument – Teacher’s Corner 2011 – Teacher Info.
Gifford Pinchot National Forest
USDA Forest Service

Constructive Destruction

Indoor Activity

Time Commitment: 45 minutes to 1 hour
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 defensible predictions of the future of Mount St. Helens.

Washington Essential Academic Learning Requirements

1.1.2 Motion of Objects

Understand the positions, relative speeds, and changes of speed of objects.

- Describe and measure the position or change in position of one or two objects.
- Measure and describe the speed of an object relative to the speed of another object.

1.1.5 Nature and Properties of Earth Materials

Understand how to classify rocks, soils, air and water into groups based on their chemical and physical properties.

- Describe the properties of minerals and rocks that give evidence as to how they formed.

1.2.1 Structure of Physical Earth/Space and Living Systems

Analyze how the parts of the system interconnect and influence each other

- Explain how the parts of the system interconnect and influence each other
- Describe the flow of matter and energy through a system
- Describe the interactions and influences between two or more simple systems.

1.2.4 Components and Patterns of Earth Systems

Understand the components and interconnections of Earth's systems.

- Describe the components of the Earth's systems.
- Describe the interactions among the components of the Earth's systems.
- Describe magma.

1.3.1 Nature of Force

Understand factors that affect the strength and direction of forces.

- Observe and describe factors that affect the strength of forces.
- Describe the pressure of force.

1.3.2 Forces to Explain Motion

Understand how balanced and unbalanced forces can change the motion of objects.

- Investigate balanced and unbalanced forces acting on an object.
- Investigate and describe pressure differences that result in unbalanced forces moving objects.

1.3.3 Conservation of Matter and Energy

Understand that matter is conserved during physical and chemical changes

- Observe and describe evidence of physical and chemical changes on matter.

1.3.4 Processes and Interactions in the Earth's system

Understand the processes that continually change the surface of the Earth.

- Describe how heat, energy flow, and movement beneath the Earth's crust cause earthquakes and volcanoes.
- Describe how constructive forces change landforms.
- Describe how destructive processes change landforms.
- Describe the processes involved in the rock cycle.

3.2.5 Evolution of Scientific Ideas

Understand that increased comprehension of systems leads to new inquiry.

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

Constructive Destruction

Indoor Activity

Directions: Each exhibit in the visitor center will show you evidence of constructive and destructive forces at Mount St. Helens. Use the exhibits in the visitor center to answer the questions in any order you choose, except the final question which must be answered last.

Find the **'Topographic model with colored lights'**. Listen to the description of the eruption and fill in the chart below. Match the different events with the colors used in the model. Explain why each eruptive event was destructive, constructive or both.

Eruptive Events order they took place	Color of Eruptive Event	Constructive, Destructive, or Both?
#1		
#2		
#3		
#4		
#5		
#6		

Find the exhibit **'There are Different Recipes for Eruption'**. Read the panels and examine the rocks.

Circle which volcano explodes more violently. Kilauea OR Mount St. Helens

Circle which type of lava contains the least amount of silica. Basalt OR Dacite

What type of volcano, shield or composite, do you think is the most destructive? Why?

Find the exhibit **'Seismic Signatures'**. Place your hands on the pads and feel the earthquakes. Which signature was the most destructive at Mount St. Helens? _____

Find the **large black and white mural of Mount St. Helens** and answer the next five questions.

Go to the panel '**The Eruptive History of Mount St. Helens**'. Were the eruptions that created these three rocks destructive, constructive or both? Why?

Go to the panel '**Lava Domes Rebuild Mount St. Helens**'. Circle which type of dacite lava is destructive. Gas-rich Dacite Lava OR Gas-poor Dacite Lava

Describe how the formation of the 1980-86 and 2004-2008 lava domes were similar and different.

Watch the video entitled **Crater Glacier**. What feature created by the destructive May 18, 1980 eruption allowed the glacier to form?

What do you think will happen to the crater glacier in the future, will it retreat or advance? Why?

Go to the '**Shattered Tree Stump** and find the display about tree rings. Circle what the tree rings indicate about Mount St. Helens eruptive history: Explosive History OR Non-explosive History

Find the exhibit entitled '**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 eruption, 1980-86 lava dome and 2004-2008 lava dome show ways Mount St. Helens builds and destroys itself. How do you think Mount St. Helens will look 500 years from now?

Answer Sheet to Constructive Destruction

Indoor Activity

Directions: Answer the questions using the exhibits in the visitor center. Each exhibit will show you evidence of the constructive and destructive forces at Mount St. Helens. Answer the questions in any order you choose, except the final question which must be answered last.

Find the ‘**Topographic model with colored lights**’. Listen to the description of the eruption and fill in the chart below. Match the different events with the colors used in the model. Explain why each eruptive event was destructive, constructive or both.

Eruptive Events order they took place	Color of Eruptive Event	Constructive, Destructive, or Both?
#1 Landslide	<i>Bluish-Green</i>	Both; <i>The landslide destroyed much of mountain--Ninety percent of what is now missing collapsed in the landslide. However, it also filled the Toutle River Valley with hundreds of feet of rock, doubled the size of Spirit Lake, created Coldwater and Castle Lakes, and 150 new ponds and wetlands.</i>
#2 Lateral Blast	<i>Orange</i>	Destructive; <i>The lateral blast erupted lava from Mount St. Helens. This further destroyed the mountain and the surrounding forest.</i>
#3 Ash Plume	<i>White</i>	Both; <i>Ash and pumice from the plume injured trees and buried plants and crops. Pumice creates well drained “soils” in a wet climate, and in time the ash will become nutrient rich.</i>
#4 Mudflows	<i>Red</i>	Both; <i>Mudflows destroyed fish habitat, houses, bridges, and clogged river valleys with debris. However, the deposits also raised the valley bottoms.</i>
#5 Pyroclastic Flows	<i>Red</i>	Both; <i>Pyroclastic flows raised the valley by covering the landslide with pumice and ash, but were also so hot that they killed all life forms directly in their pathway.</i>
#6 Dome Building	<i>Yellowish-White</i>	Constructive; <i>The volcano rebuilds itself by creating new lava domes.</i>

Find the exhibit ‘**There are Different Recipes for Eruption**’. Read the panels and examine the rocks.

Circle which volcano explodes more violently.

Kilauea

OR

Mount St. Helens

Circle which type of lava contains the least amount of silica.

Basalt

OR

Dacite

Which type of volcano, shield or composite volcanoes, do you think are the most destructive? Why?

The answer is subjective. The entire chain of Hawaiian Islands is the result of eruptions that produced layer after layer of thin-fast-moving basalt lava. These eruptions of basalt lava constructed the Hawaiian Islands, but they also destroyed forests and communities. It takes decades for soils to form in areas impacted by these lava flows basaltic eruptions, which greatly slows the pace of recovery. Composite volcanoes can erupt with tremendous violence. The results of the May 18th eruption are impressive, but Mount St. Helens has experienced eruptions 16 times larger than the 1980 event.

Find the exhibit '**Seismic Signatures**'. Place your hands on the pads and feel the earthquakes. Which signature was the most destructive at Mount St. Helens? Some students may select the 7.7 magnitude long distance or the 3.5 magnitude regional earthquake signatures, but these events did not affect Mount St. Helens. The 3.5 magnitude regional earthquake was too small, and the 7.7 long-distance earthquake was too far away. The best answer to this question is 'crater rockfalls'. Large and small rock avalanches constantly fall down the crater walls of Mount St. Helens.

Find the **large black and white mural of Mount St. Helens** and answer the next five questions.

Go to the panel '**The Eruptive History of Mount St. Helens**'. Were the eruptions that created these three rocks destructive, constructive or both? Why?

Both! The basalt eruption was mostly constructive, adding layers of lava onto the slopes of the volcano and constructing Ape Cave, but it also destroyed forests south and north of Mount St. Helens. The andesite eruptions were also mostly constructive. They added layers of lava onto the slopes of the volcano and destroyed forests south of the Mount St. Helens. The dacite eruption formed a large lava dome, but a partial collapse of this dome powered a lateral blast that blew down trees 4 1/2 miles northeast of Mount St. Helens.

Go to the panel '**Lava Domes Rebuild Mount St. Helens**'. Circle which type of dacite lava is destructive. Gas-rich Dacite Lava OR Gas-poor Dacite Lava

Describe how the formation of the 1980-86 and 2004-2008 lava domes were similar and different.

The domes are similar in that they are both the result of eruptions of dacite lava and they are about equal in size. However, the time frame in which they formed and the way in which the lava erupted differed. The 1980-86 lava dome was the result of 17 episodic eruptive events. The dome formed in two ways. Lobes of lava intermittently oozed out and stacked up on top of each other, or the entire dome inflated like a balloon as lava intruded into its interior. The 2004-2008 lava dome formed

continuously for three years and three months. Partially cooled and hardened lava erupted in a series of spectacular smooth spines that gradually toppled over and formed mounds of rubble.

Watch the video entitled **Crater Glacier**. What feature created by the destructive May 18, 1980 eruption allowed the glacier to form?

The horseshoe-shaped crater played a critical role in collecting snow. Shade cast by the crater walls insulated the 50-feet of snow deposited each winter, and rock falls off the crater walls further insulated the snowpack. A unique set of circumstances--the crater's horseshoe shape, towering crater walls and rockfalls—enabled the crater glacier to form in a remarkable short period of time.

What do you think will happen to the crater glacier in the future, will it retreat or advance? Why? The 2004-2008 lava dome-building eruption pushed the glacier out from protective shade on the south side of the crater floor onto the north side of the crater floor. The glacier is exposed to direct sunlight. This direct exposure to sun and the low elevation of the crater floor (lowest elevation for most glaciers in the Cascade Mountain Range) will likely cause the glacier to retreat in the future. However the glacier is currently advancing towards a canyon on the crater floor. If it drops into this protective canyon, it may be able to continue to advance.

Go to the '**Shattered Tree Stump**' and find the display about tree rings. Circle what the tree rings indicate about Mount St. Helens eruptive history: Explosive History OR Non-explosive History
Scientists who study tree rings have determined that Mount St. Helens exploded violently in the years 1480, 1482, 1490, and 1800.

Find the exhibit entitled '**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.

The May 18, 1980 eruption, 1980-86 lava dome and 2004-2008 lava dome show ways Mount St. Helens builds and destroys itself. How do you think Mount St. Helens will look 500 years from now?

The 1980-86 dome and 2004-2008 lava domes have already replaced 4% of what was lost during the May 18, 1980 eruption. In the past, Mount St Helens has often remained intermittently active for 50 to 100 years after a major eruption like the May 18, 1980 event. Over the past 4,000 years the volcano has awakened and erupted every 150 to 200 years, so the crater we see today could look very different 500 years from now.