



# Mount St. Helen's Visitor Center: Teacher Resources 2016

## Visiting a volcano:

### Grade 9-12 building activity sheet

Time Commitment: 35-40 minutes  
Location: Mount St. Helens Visitor Center  
Site: Exhibit

The purpose of this worksheet is so that students will be able to follow the displays inside of the visitor center. Students will be able to understand the formation of Mt. St. Helens and understand the impacts of the May 18<sup>th</sup> 1980 eruption. The students will be best served by looking at the exhibits and film to get a better grasp on the information regarding the eruption of Mount St. Helens.

Goal: the student will be able to understand how plate tectonics form stratovolcanoes like Mount St. Helens and the impacts it has on the surrounding environment.

#### Objectives:

- 1) Students will be able to use the scientific method to draw a reasonable conclusion
- 2) Students will be able to compare and contrast information.
- 3) Students will be able to read informational text and find the main ideas and infer relationships between what they see around them and the text.

#### Next Generation Science Standards:

**HS-ESS1-5:** Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.

- Describe how the layers on a strato-volcano like Mount St. Helens reflect the eruptive history.

**HS-ESS2-1:** Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

- Illustrate the movement of the plates along a subduction zone.
- Explain how the movements of plates create volcanoes to form.

**HS-ESS2-2:** Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

- Describe how the changes of the geology of Mount St. Helens caused the eruption of 1980 to be so devastating.
- Explain how the survivors of an eruption would be better adapted to living in an area with seismic and volcanic activity.

## **Common Core Standards:**

### **CCSS.ELA-Literacy.RI.9-10.1**

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

### **CCSS.ELA-Literacy.RI.9-10.2**

Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

### **CCSS.ELA-Literacy.RI.9-10.3**

Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

### **CCSS.ELA-Literacy.RI.9-10.4**

Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

### **CCSS.ELA-Literacy.RI.11-12.1**

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

### **CCSS.ELA-Literacy.RI.11-12.2**

Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.

### **CCSS.ELA-Literacy.RI.11-12.3**

Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

### **CCSS.ELA-Literacy.RI.11-12.4**

Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

### **CCSS.ELA-Literacy.RH.9-10.1**

Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.

### **CCSS.ELA-Literacy.RH.9-10.2**

Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.

### **CCSS.ELA-Literacy.RH.9-10.3**

Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.

### **CCSS.ELA-Literacy.RH.9-10.4**

Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.

### **CCSS.ELA-Literacy.RH.9-10.7**

Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.

### **CCSS.ELA-Literacy.RH.11-12.1**

Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

### CCSS.ELA-Literacy.RH.11-12.2

Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.

### CCSS.ELA-Literacy.RH.11-12.3

Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.

### CCSS.ELA-Literacy.RH.11-12.4

Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines *faction* in *Federalist* No. 10).

# – Answer Key –

## Visiting a Volcano:

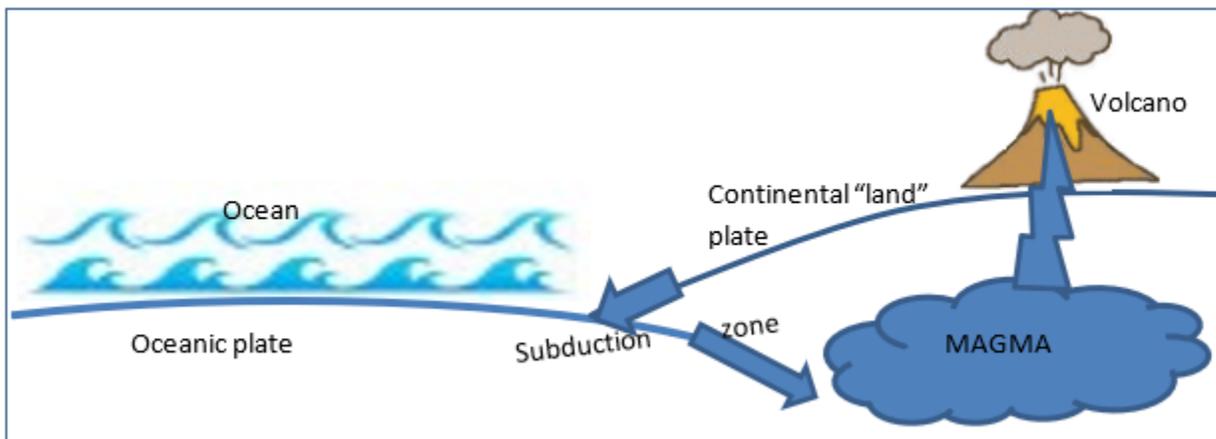
Welcome to the Mount St. Helens Visitor Center, use the displays in the center to help you find the answers and solve the case about the volcano.

**Mission:** using the case clues to find out how and why Mount St. Helens erupted.

### Clues:

1. Mount St. Helens is a stratovolcano, which means it is made in layers where each eruption sits on top of the previous. It is like a layered cake where the frosting and cake are stacked on top of each other.
2. The magma chamber underneath the mountain is filled with molten Dacite rocks which have a huge amount of gas bubbles floating around inside of it. That gas makes very explosive eruptions.
3. Mount St. Helens is the youngest/smallest but most active of the volcanoes in the Cascade Range. The Cascade Range of volcanoes stretches from northern California to southern Canada.

1. While looking at the displays about plate tectonics and how volcanoes form draw the movement of a subduction zone similar to what is seen along the Juan de Fuca Fault.



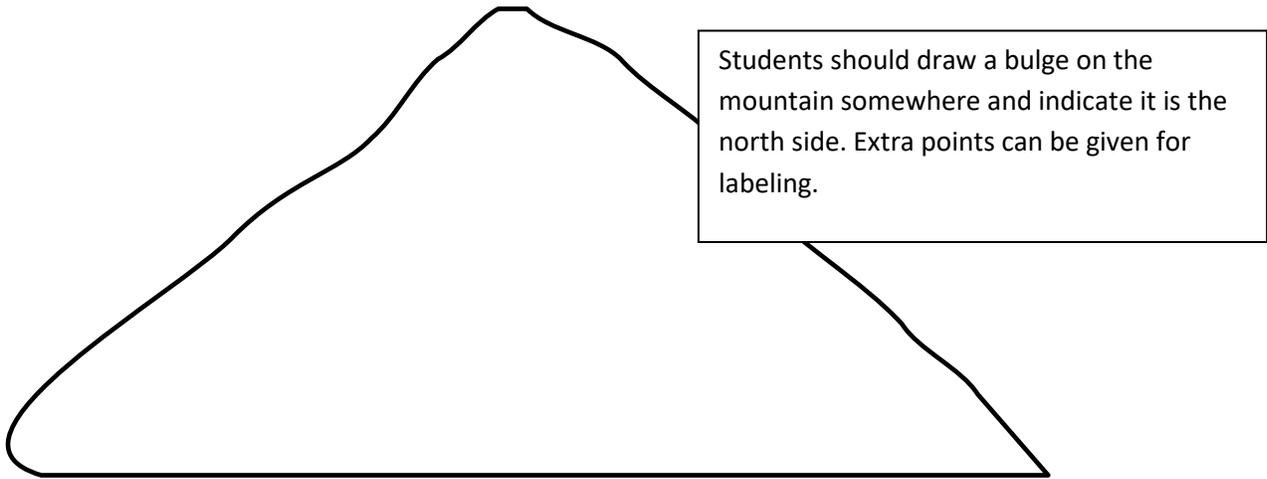
2. Give a detailed description of how this movement could create a volcano or range of volcanoes like the Cascade Range and Mount St. Helens.

Answer should include how a subduction zone is where a heavier plate sinks below another, the crust melts into magma, underground chamber eventually fills emerges to the surface to create a volcano.

3. Based on what you know about plate tectonics relate the frequency of eruptive activity on Mount St. Helens to the movements along the Juan De Fuca fault line.

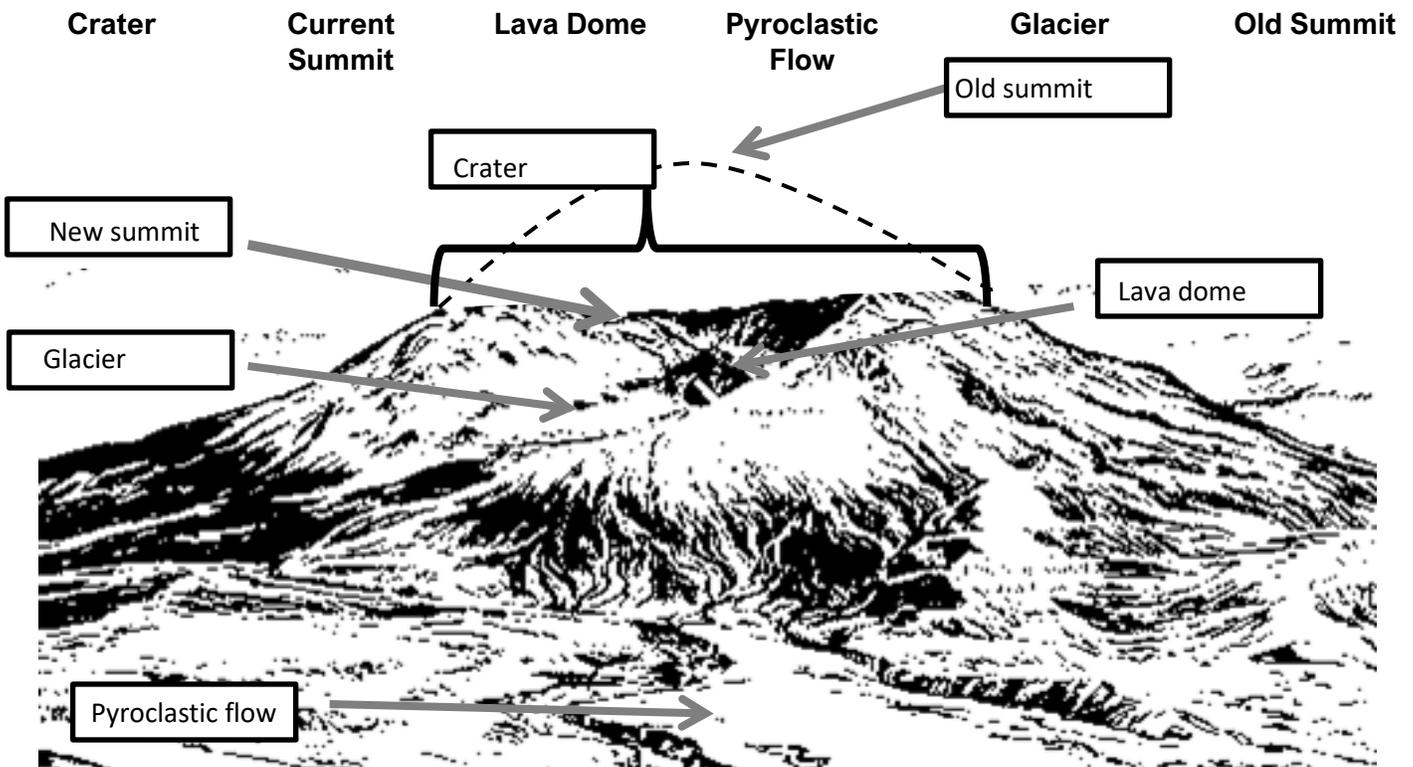
Answers should include describing the subduction zone of the Juan De Fuca fault, that the movement creates more magma to fill the underground chambers, that the pressure will build when the chambers fill, and the eruptions occur once enough pressure has been created.

4. List some of the activities and places that were common for visitors to do/see around Mount St. Helens and Spirit Lake prior to 1980
- a. Answers can include hiking, swimming, fishing, camping, skiing, mining, logging, climbing, wildlife watching, & use by Native Americans.
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
5. Based on what you know about volcanic eruptions, assess how a volcano erupting might affect one of the activities or places you listed above.
- Answers can include destroyed the area, or changed the landscape, and that some areas are not yet recovered enough to do those activities again.
6. Below, draw the changes seen on Mount St. Helens during April 30<sup>th</sup> to May 17<sup>th</sup> and describe why that may have caused the eruption of 1980 to be so destructive.



Answers should include information about the “bulge” forming and how it could form a landslide/avalanche. Students should also conclude that the movement of the “bulge” caused the directed/lateral blast.

7. On the picture label each part of the volcano using the word bank below.



8. Looking at the ash plume display, list the eruptions by size and write the amount of ejecta for each eruption below:

- |   |   |
|---|---|
| 1. <u>Mount Mazama – 150 km<sup>3</sup> (4850 BC)</u> | 5. <u>Vesuvius – 9 km<sup>3</sup> (79 AD)</u>           |
| 2. <u>Tamboura – 80 km<sup>3</sup> (1815)</u>         | 6. <u>Mt. St. Helens – 4 km<sup>3</sup> (1900)</u>      |
| 3. <u>Mt. Katmai – 30 km<sup>3</sup> (1912)</u>       | 7. <u>Mt. St. Helens – 1 km<sup>3</sup> (1500/1980)</u> |
| 4. <u>Krakatoa – 20 km<sup>3</sup> (1883)</u>         | 8. <u>Mt. St. Helens – 1 km<sup>3</sup> (1500/1980)</u> |

9. Using the information from above, would the size of the eruption of Mount St. Helens in 1980 be larger or smaller than the eruption of other volcanoes and give one reason why.

Answers should include evidence from the list and that it is smallest or second smallest.

10. How does the 1980 eruption compare to other eruptions listed for Mount St. Helens on the ash plume display?

Answers should be smallest or second smallest eruption by size.

11. As you look at the “Layers of the Mountain” you can see the history of Mount St. Helens, as a land constantly changing. Looking at the display correctly label the drawing below with the dates and a short description of what that the layer represents.

The diagram shows a vertical cross-section of Mount St. Helens with several distinct layers. From top to bottom, the layers are:

- A thin dark brown layer at the very top.
- A thick layer of light grey pumice with a double-layer appearance.
- A thin dark brown layer.
- A thick layer of light grey pumice.
- A thin layer of dark charcoal.
- A thick layer of light grey pumice.
- A thin dark brown layer.
- A thick layer of light grey pumice.

Arrows point from text boxes to the corresponding layers:

- May 18, 1980: Grey Dacite erupted first then frothy pumice covered creating a double layer look.
- AD 1800-1980: forest flourished.
- AD 1800: explosive event, same amount of pumice as 1908.
- AD 1489-1566: small explosive events
- AD 1480: largest eruption in last 3,000 years, ash spread 250 miles or more.
- AD 950-1480: forest thrived.
- AD 750-950: charcoal=trees destroyed, lateral blast.

12. What does this layering on the mountain tell us about the history of Mount St. Helens (I.E. the eruptive periods, length, frequency, etc.)? Give one example in your answer to defend your idea.

Answers should include: many eruptions have occurred, some eruptions lasted many years some shorter, forests thrived between eruptions, students should compare date and years as well.

13. Look at the “Survivors of the Blast” display and in the table below provide an example of a survivor of the blast and the feature that allowed them to survive.

Type of Survivor	Feature that helped them survive	How they survived the blast
Pocket gopher	Burrowing	Being in burrow
Ant	Underground living	Being home
Salamander	Hibernating	Hibernating in winter
Plant	Living underground/double roots	Not having sprouted yet/one set of roots survive
Fish	Under ice	Ponds/lakes under ice
Tree roots	Double roots	Covered by soil and snow

14. If you were around at the time of the eruption in 1980 what types of adaptations would you want to have that you think might help you survive in the blast zone? Why would you choose that particular adaptation?

Answers should include living underground, hibernation, living underwater/ice. Migration and having not begun to grow for the season.

**–End Answer Key –**

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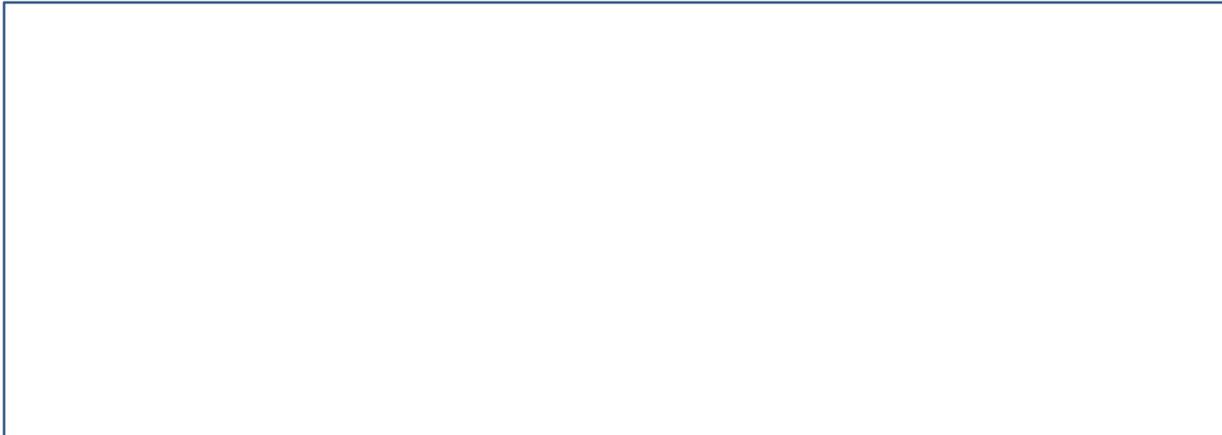
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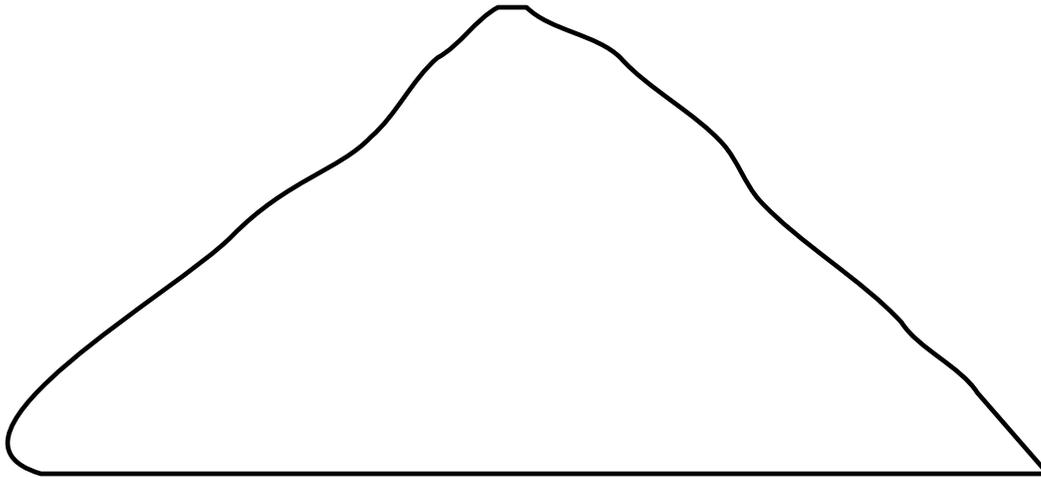
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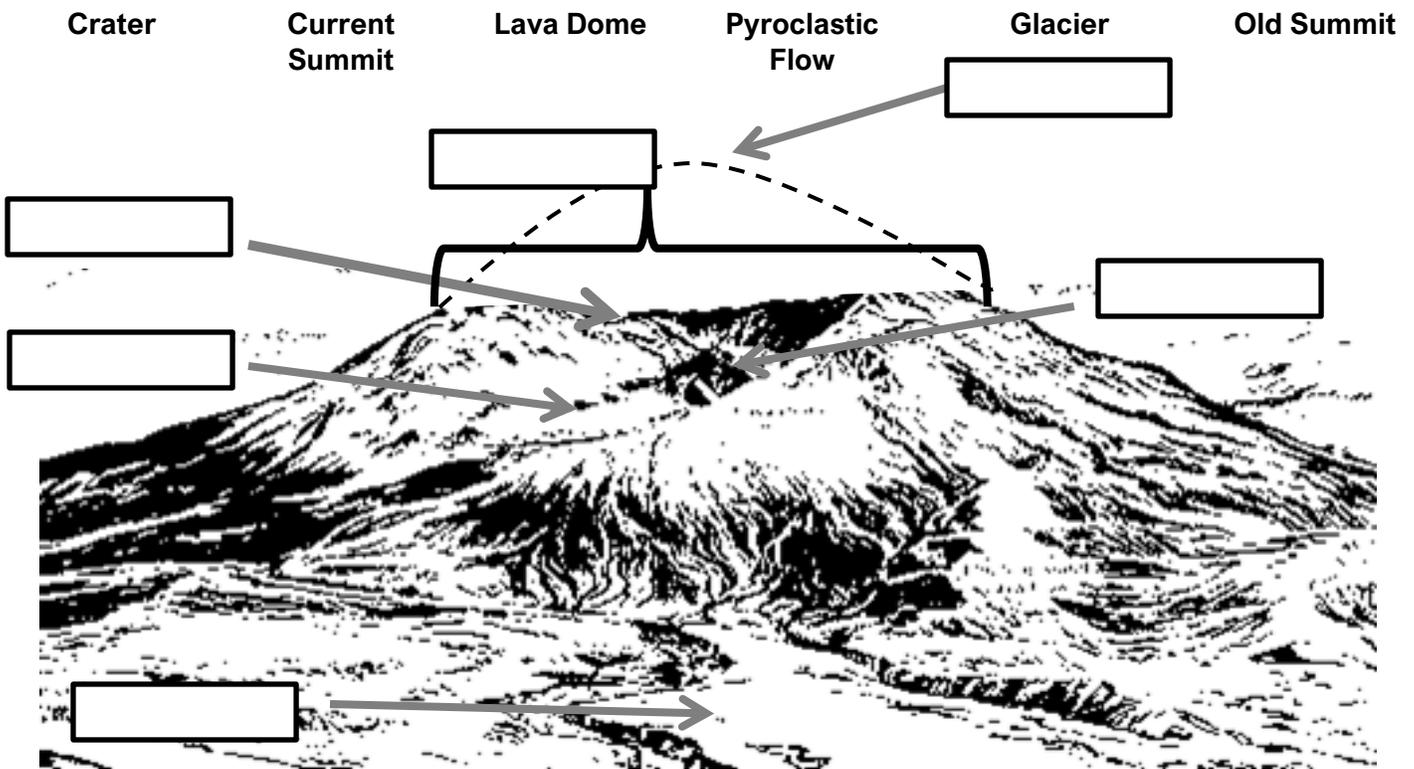
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