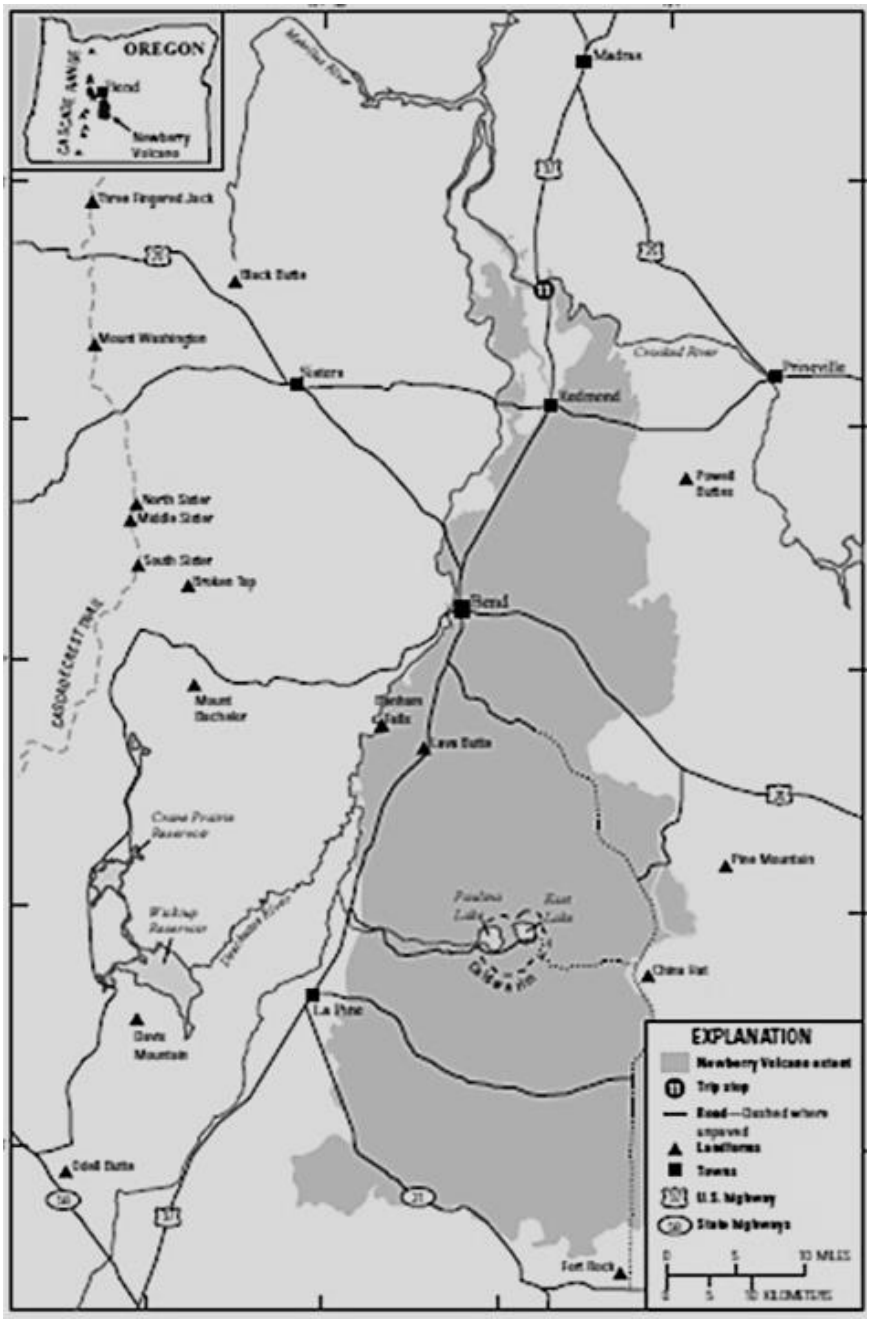
At Home Activities for the Trail of the Molten Land Video Tour

Trailhead and Tour Overview

Do you live with a volcano in your neighborhood?

Study the darker gray shading on this map to see the entire area of Newberry Volcano. Then, find a map of where you live or where you go to school. Compare your location to the map of Newberry Volcano. Do you live on or near Newberry Volcano?



Map is from **Field-Trip Guide to the Geologic Highlights of Newberry Volcano, Oregon, 2017, USGS publication**

Stop 1 – Step Into Another World

Rock Formations and Layers Around Your Home:

Use the back of this page or another paper to write down or draw your observations of rock formations and rock layers around your home. Consider these questions:

1. Can you find volcanic ash, boulders of basalt, or cinders from a cinder cone volcano? Which ones do you find?
2. Do you see more soil than rocks? (Maybe soil was placed here for trees & plants)
3. What kind of rock formations or rock layers do you think you might find under the top layer of rocks or soil? (Rather than use your imagination, if you would prefer to do some digging to find out, please ask permission from an adult first.)
4. Imagine the rock formations and layers changing over time. What do you think some of the earlier rock layers look liked, the ones underground? Think about how the rock formations or layers on the surface are similar or different from the ones below?

Stop 2 – It Began With a Bang …

Modeling Explosive and Effusive Eruptions:

Model explosive and effusive eruptions using 2 cans of soda, either outside, or inside where it is alright to make a mess, such as a kitchen. Ask an adult for permission to do these messy experiments.

Materials: 2 soda cans

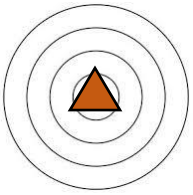
1. Shake both soda cans for 10 seconds. Then set down the cans.
2. For one soda can, open it quickly, within one second. This models an explosive eruption, where the soda represents magma, and the gases in the soda are like gases in magma. The gases in the magma are under high pressure, and once gases escape into the air, it launches the magma (or soda) high into the air.
3. For the other soda can, open the tab very slowly over 30 seconds. This will model an effusive eruption, where less pressure from gases in the magma causes it to ooze or flow out rather than explode.
4. Go back to your notes on rock patterns near your home. Write down which type of eruption you think formed those rocks, explosive or effusive. Write down why you think it's that eruption type, based on the size, colors, and textures of the rocks.

Stop 3 – Great Balls of Fire

Erosion Experiments: It could get messy again, so ask an adult for permission to set up the experiments outside, or inside in a kitchen to easily clean the mess.

Materials:

- 2 different types of dirt or rock materials (or use very small toys that can get wet, are light weight and a second type of toy that is a little bigger and heavier)
- Spray bottle with water or a cup of water
- *Optional:* paper with bullseye circles around mounds, or if set up on pavement, use chalk to draw bullseye circles round the 2 cones.



1. *Optional*: Set up bullseye circles for the 2 cones, place 2 pieces of paper down first side by side, then place one cone on each paper and draw bullseye circles around the cones. Or, if placing cones on the pavement, you may also draw bullseye circles using chalk.
2. Use volcanic ash or soil to make one cone. Use cinder rocks or other slightly larger & heavier rocks to make a second cone. Or, if you don't have soil or rocks, use small toys or materials at your house that can get wet, and make a cone of small light weight toys and a second cone of slightly larger and heavier toys.
3. Write a hypothesis to predict what will happen when wind and water erosion occurs on ash and cinder cones, or your cones made of different materials.
4. Use the table below to draw *before* pictures to record your observations of what the 2 cones look like. Include the bullseye circles if you choose to do this step.
5. Get up close to one cone and blow on the sediments or rocks. See if you can make some of the material move from its original pile. Repeat with the 2nd cone.
6. Draw *after* pictures for both cones, noting where material **eroded** or moved, and where it got **deposited** or piled somewhere new from the wind. Which type of material eroded and deposited more sediments or rocks from wind erosion?
7. Reconstruct the 2 cones to look like the *before* picture again. Get ready to make a mess by using a spray bottle with water or a cup of water to pretend it is raining on the two cones. Spray or pour the water on the cones.
8. Draw *after* pictures for both cones, noting where material **eroded** or moved, and where it got **deposited** or piled somewhere new from the rain or water. Which type of material eroded and deposited more sediments or rocks from water erosion?
9. Did you notice if wind or water caused more or less erosion? Did more or less erosion occur depending on the types of sediments, rocks, or other materials used?

Note: These erosion experiments model erosion occurring very quickly. In real life, it rarely happens quickly and more often occurs very slowly over many years or much longer.

Experiment: Set up models of mini cones using different materials, volcanic ash and cinder rock, or other light weight and slightly heavier materials. Mimic wind & water erosion. What are the results?

Hypothesis: Write a clear, testable statement, that considers the experiment's variables (wind/water, ash/cinder or other materials from home) and possible results.

If _____,
then _____.

Before: Draw **Ash** Cone (or lightweight materials)	Before: Draw **Cinder** Cone (or slightly heavier materials)
After: Draw **Ash** Cone after wind erosion & deposition	After: Draw **Cinder** Cone after wind erosion & deposition
After: Draw **Ash** Cone after water erosion & deposition	After: Draw **Cinder** Cone after water erosion & deposition

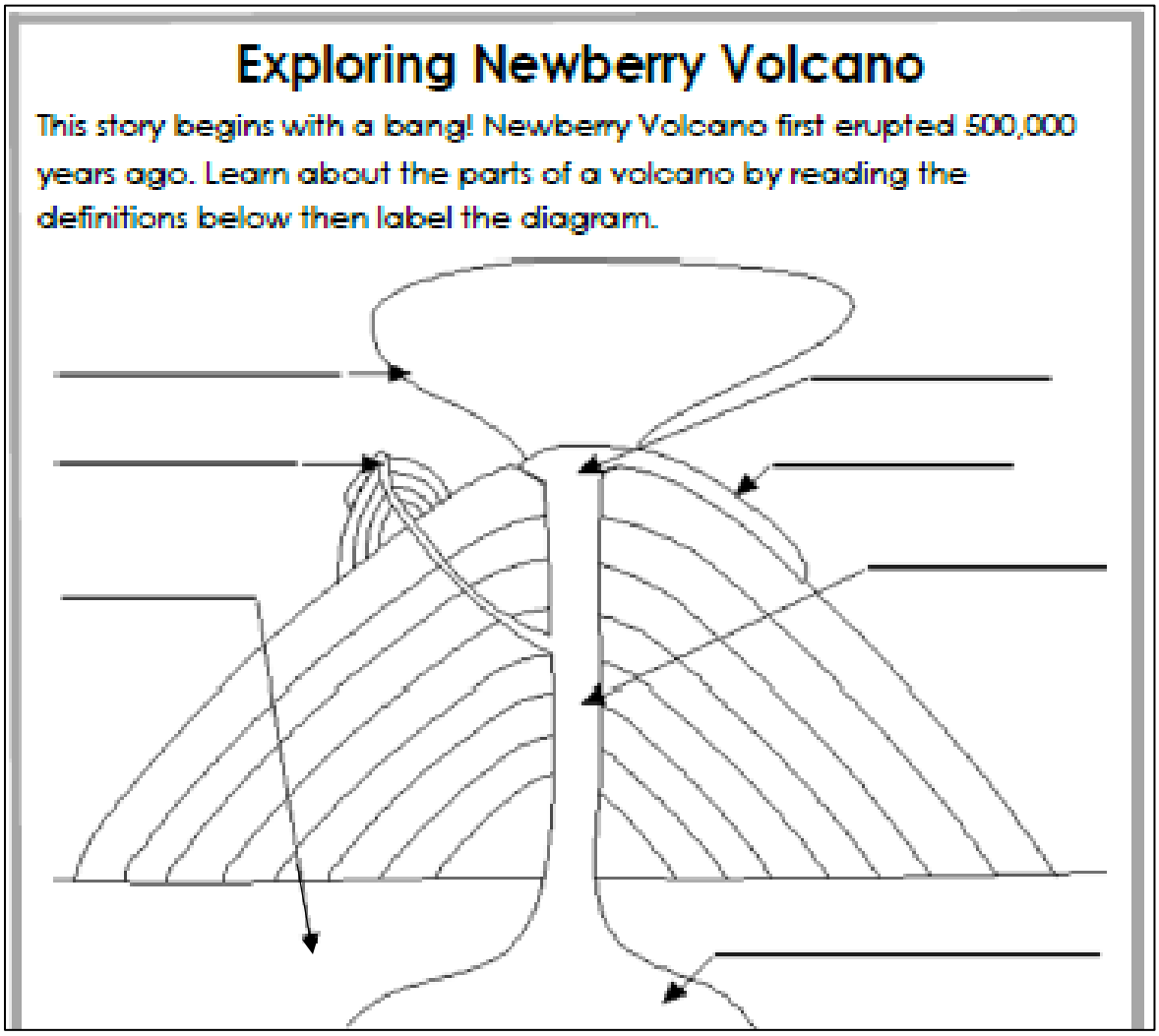
Stop 4 – Central Oregon's Sleeping Giant

Oreo Tectonics: Watch this video link to use Oreo cookies as a way to model plate tectonics. https://www.youtube.com/watch?v=dR4-n9XKNSY Yes, you will need Oreo cookies, a pencil, a cup of water, and the table below to draw your observations.

Oreo Top View	Oreo Side View with labels (crust & upper mantle, middle mantle, and lower mantle)
Divergent Boundary Top View	Divergent Boundary Side View
Transform Boundary Top View	Transform Boundary Side View
Convergent Boundary (Subduction) Top View	Convergent Boundary (Subduction) Side View
Convergent Boundary (Uplift) Top View	Convergent Boundary (Uplift) Side View

Stop 5 – Lava Finds a New Path

Parts of a Volcano: Complete the diagram below by labeling the different parts of a volcano.



Definitions:

Ash cloud- Forms over a volcano and fills the air after some eruptions

Conduit- A pipe-like passage through which magma (molten rock) flows

Crust- The Earth's surface or outermost rocky layer

Lava- Molten or solidified rock on the surface of the Earth, it flows out of erupting volcanoes

Magma chamber- Contains magma (molten rock) deep within the Earth's crust

Vent- An opening in the Earth's surface through which volcanic materials erupt

Side vent- An opening through which lava erupts to the side of the main conduit of a volcano

Stop 6 – Volcanic Peaks, Shrinking Glaciers

A String of Volcanoes: (content & images below are from Living with a Volcano in Your Backyard, a USGS publication)

Materials: Volcano pictures, facts about volcanoes, scissors, maps of Oregon Cascades (find on the internet or refer to Oregon octagon pic), long string or clothesline, clothespins or paperclips/tape for each volcano picture

1. Fill in the blanks for each volcano on the pictures below using information you have researched on the Cascades Volcano Observatory (https://volcanoes.usgs.gov/observatories/cvo/) or using the fact sheets below.
2. Cut out the pictures and use maps to create a string of volcanoes in the correct order from north to south for the Cascade Mountain Range in Oregon.
3. Use a string and clothespins or paperclips to hang the mountain pictures on the string in the correct order.
4. Tie both ends of the string to a place in your home to refer to the different volcanic mountains in the Cascades.

Mount Hood

Location: Northern Oregon
Elevation: 3,426 meters (11,239 feet)
Closest cities: The Dalles, Hood River, Troutdale and Portland, Oregon; White Salmon and Vancouver, Washington
Most recent volcanic activity: Numerous nineteenth-century steam eruptions; most recent major eruption occurred in 1780's; formed lava domes, pyroclastic flows and lahars
Most likely volcano hazards: Lava flows and domes, pyroclastic flows, lahars
Another fact about this volcano: Stratovolcano; named Wy'east by Native Americans Oregon's most recently erupting volcano; highest peak in Oregon; only Oregon volcano to produce yearly earthquake swarms; eruption in 1780's triggered lahar in Sandy River Valley that reached the Columbia River and formed a delta of quicksand; Lewis and Clark noted this in their journals and named river the "Quicksand River"

Newberry Crater

Location: Central Oregon
Elevation: 2,434 meters (7,985 feet)
Closest cities: Bend, Oregon
Most recent volcanic activity: Big Obsidian Flow (lava flow) formed 1,300 years ago
Most likely volcano hazards: Lava flows, tephra and lahars
Another fact about this volcano: Shield volcano and caldera; covers 1,300 square kilometers (500 square miles); lava flows extend to city of Bend, Oregon, and beyond; more than 400 cinder cones dot the flanks of this volcano

Mount Jefferson

Location: North central Oregon

Elevation: 3,199 meters (10,495 feet)

Closest cities: Bend, Madras and Salem, Oregon

Most recent volcanic activity: lava flows and domes, pyroclastic flows and lahars during the last ice age

Most likely volcano hazards: Tephra, landslides, lahars, future eruptions likely to be from smaller adjacent volcanoes

Another fact about this volcano: Stratovolcano; least active volcano in the Cascade Range—no known eruptions during the last 20,000 years; erupted repeatedly for hundreds of thousands of years, with its last eruptive episode during the ice ages; Lewis and Clark named this volcano in honor of President Thomas Jefferson

Three Sisters

Location: Central Oregon

Elevation: North Sister is 3,074 meters (10,085 feet); Middle Sister is 3,062 meters (10,047 feet); South Sister is 3,157 meters (10,358 feet)

Closest cities: Bend, Oregon

Most recent volcanic activity: Approximately two thousand years ago on flanks of South Sister

Most likely volcano hazards: Tephra, lava flows, pyroclastic flows, lahars

Another fact about this volcano: Stratovolcanoes, named by a group of Methodist missionaries; a broad area of volcanic uplift (about 2.5 centimeters per year (1 inch per year) is ongoing just west of South Sister; these three volcanoes have the closest spacing of any major stratovolcanoes in the Cascade Range

Crater Lake

Location: Southern Oregon

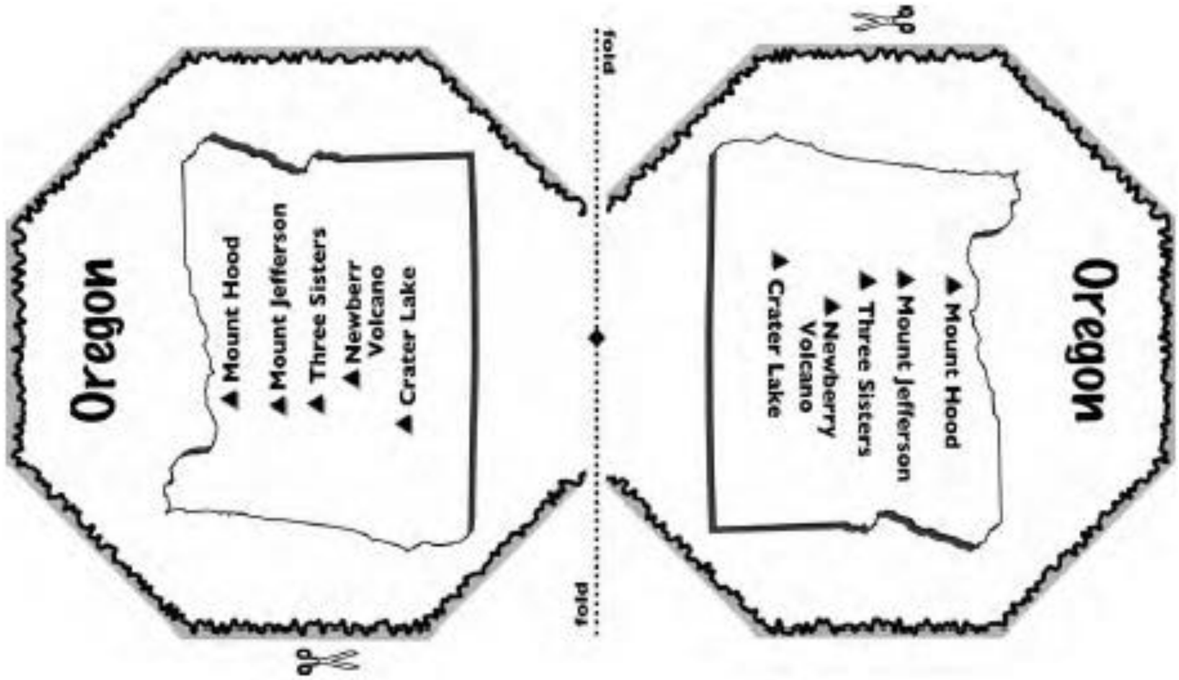
Elevation: 2,487 meters (8,156 feet) (the lake is 594 meters deep (1,949 feet)

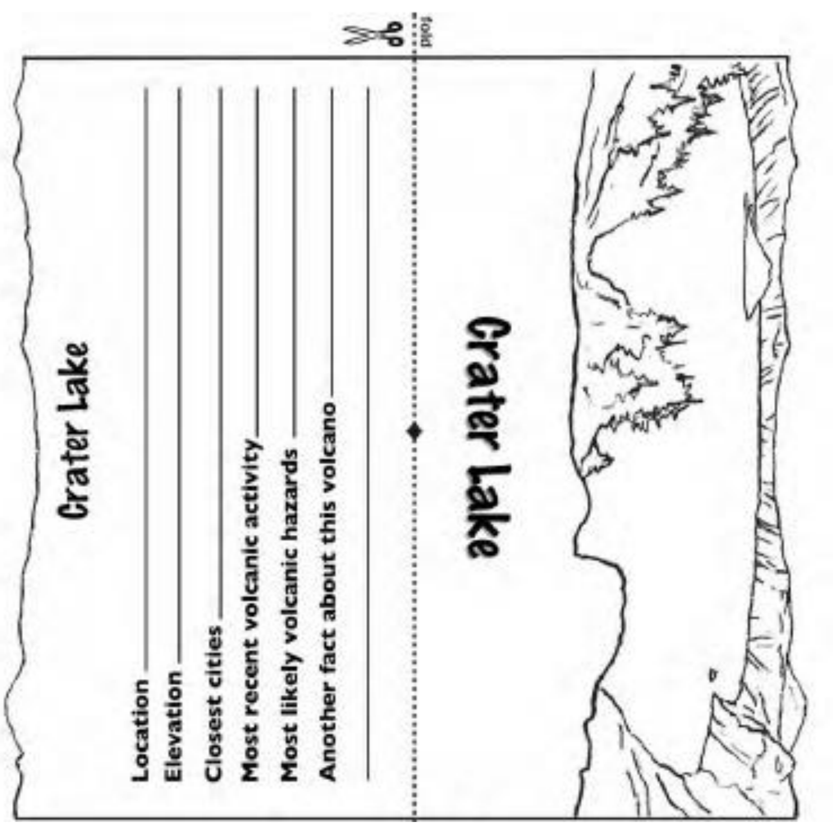
Closest cities: Medford and Klamath Falls, Oregon

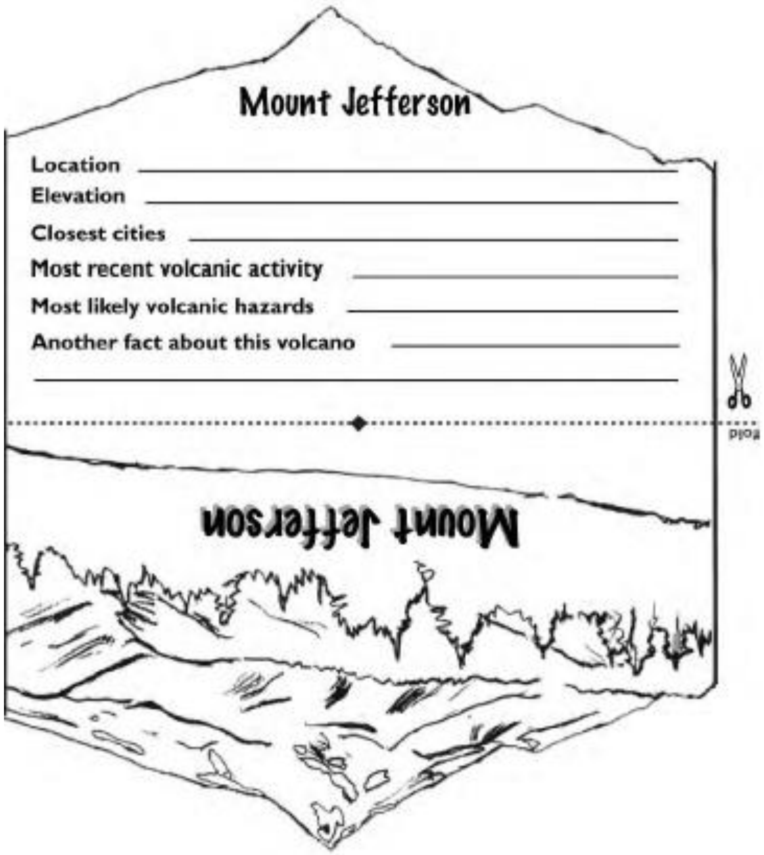
Most recent volcanic activity: Ancient Mount Mazama erupted and formed Crater Lake caldera 7,700 years ago; Wizard Island and underwater cones erupted between 7,700 and 4,800 years ago

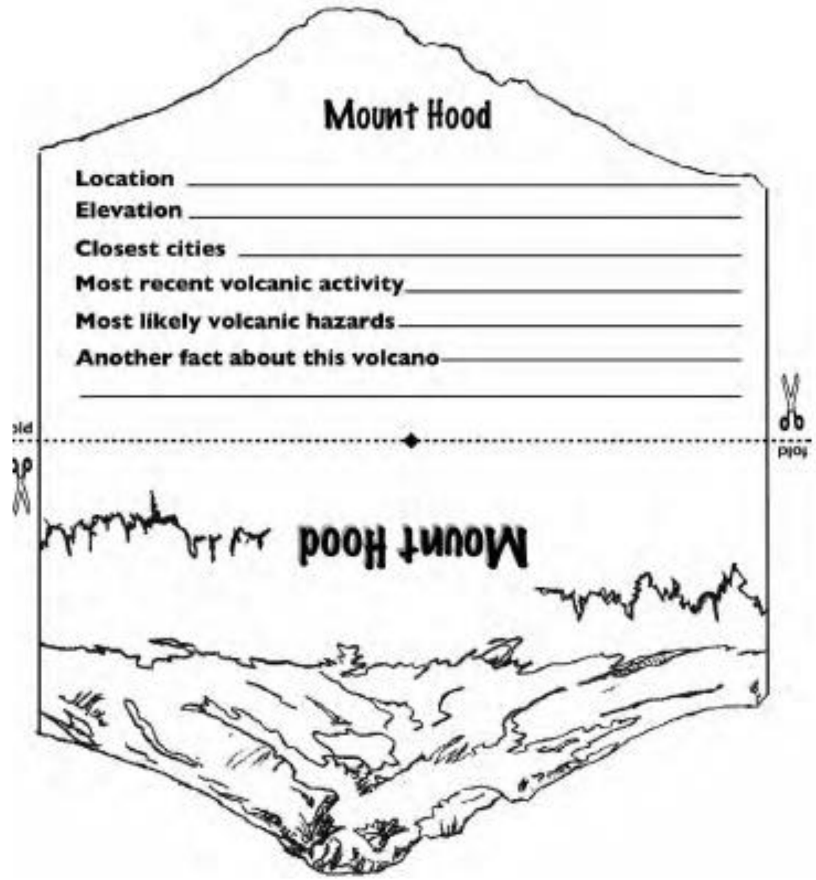
Most likely volcano hazards: Tephra, pyroclastic flows

Another fact about this volcano: Mount Mazama was a cluster of volcanoes—not a single cone; caldera-building eruption 7,700 years ago was the largest eruption to take place at a Cascade volcano during the past 100,000 years; caldera-forming eruption scattered gritty volcanic ash that can be found today, across Washington, Oregon and southern Canada; Native Americans witnessed the collapse of this volcano and kept the event alive in their legends; Crater Lake is the deepest lake in the United States


Oregon
▲ Mount Hood
▲ Mount Jefferson
▲ Three Sisters
▲ Newberr Volcano
▲ Crater Lake
fold
fold
Oregon
▲ Mount Hood
▲ Mount Jefferson
▲ Three Sisters
▲ Newberry Volcano
▲ Crater Lake


Crater Lake
Location
Elevation
Closest cities
Most recent volcanic activity
Most likely volcanic hazards
Another fact about this volcano
fold
Crater Lake


Mount Jefferson
Location
Elevation
Closest cities
Most recent volcanic activity
Most likely volcanic hazards
Another fact about this volcano
fold
Mount Jefferson


Mount Hood
Location
Elevation
Closest cities
Most recent volcanic activity
Most likely volcanic hazards
Another fact about this volcano
fold
Mount Hood

Three Sisters

Location _____

Elevation _____

Closest cities _____

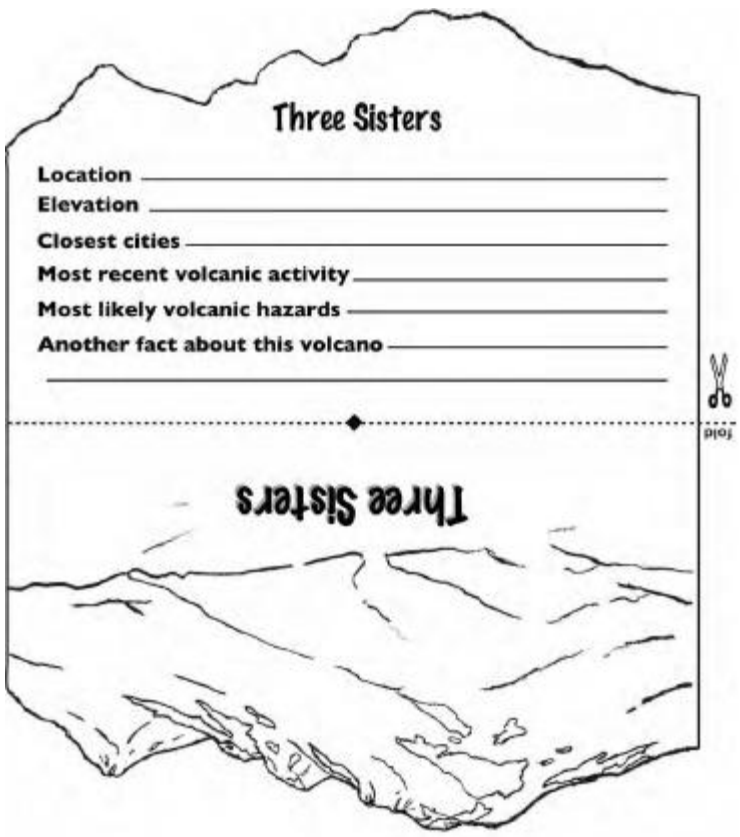
Most recent volcanic activity _____

Most likely volcanic hazards _____

Another fact about this volcano _____

_____

fold



Newberry Volcano

Location _____

Elevation _____

Closest cities _____

Most recent volcanic activity _____

Most likely volcanic hazards _____

Another fact about this volcano _____

_____

fold