

Volcanoes



1. What is volcanology and what do volcanologists do?
2. Describe the five types of volcanoes:
 - a. Composite
 - b. Cinder cone
 - c. Shield
 - d. Caldera
 - e. Fissure
3. Be able to label the parts of a volcano on a worksheet or in a drawing of your own.
 - a. Crater
 - b. Summit
 - c. Base
 - d. Conduit
 - e. Dike
 - f. Throat
 - g. Vent
 - h. Magma Reservoir
1. Describe the different types of lava. Draw a picture of each kind.
 - a. Pahoehoe Flows
 - b. Aa Flows
 - c. Block Lava
 - d. Pillow Lava
5. Define the following terms:
 - a. Pyroclastic Materials
 1. Bomb
 2. Block
 3. Cinder
 4. Pumice
 - b. Pyroclastic Flow
 - c. Lahar
 - d. Magma
 - e. Plutons
 - f. Hot Spot
6. Explain how a volcano erupts.
7. Define the four levels of volcano activity:
 - a. Active
 - b. Intermittent
 - c. Dormant
 - d. Extinct
8. What is the Ring of Fire and where is it found?
9. Describe How the Hawaiian Islands were/are still being formed.
10. Research the eruption of Mount St. Helens or some other volcano of your choice. Write a 1-page report on what you found.
11. Find a verse in the Bible that talk about volcanoes. (Hint: use a modern version).
12. Make your own 3D model of a volcano

Volcanoes Answers

1. Volcanology is the study of volcanoes. Volcanologists are the people who study volcanoes.

2.

a. **Composite:** These volcanoes are typically tens of miles across and ten thousand or more feet in height. They have moderately steep sides and sometimes have small craters in their summits. Volcanologists call these “strato-“ or composite volcanoes because they consist of layers of solid lava flows mixed with layers of sand- or gravel-like volcanic rock called cinders or volcanic ash.

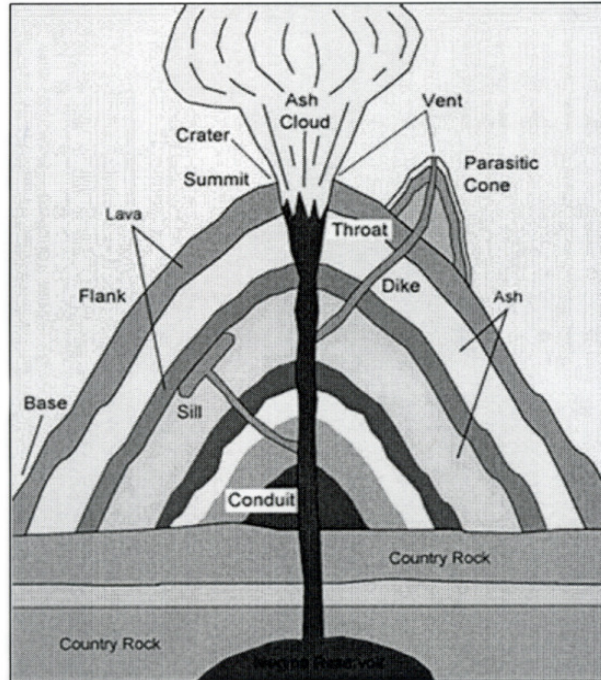
b. **Cinder Cone:** These volcanoes consist almost entirely of loose, grainy cinders and almost no lava. They are small volcanoes, usually only about a mile across and up to about a thousand feet high. They have very steep sides and usually have a small crater on top.

c. **Shield:** This type of volcano can be hundreds of miles across and many tens of thousands of feet high. The individual islands of the state of Hawaii are simply large shield volcanoes. Mauna Loa, a shield volcano on the “big” island of Hawaii, is the largest single mountain in the world, rising over 30,000 feet above the ocean floor and reaching almost 100 miles across at its base. Shield volcanoes have low slopes and consist almost entirely of frozen lavas. They almost always have large craters at their summits.

d. **Caldera:** Calderas, which are simply circular depression, are found on the summits of many volcanoes. “Giant” calderas are the largest of these; huge craters up to many tens of miles across. Giant Calderas form by collapse in gigantic eruptions that spew volcanic rocks out hundreds or even a thousand miles in all directions. Sometimes the calderas are so filled with lava and volcanic ash that there is no recognizable depression at all. These can only be found by carefully locating the big fractures or “faults” in the ground that mark the edges of the caldera. In other cases, the edges of the caldera remain as large cliffs or ridges surrounding the central depression. However, the depression is so large that a person standing in the middle of it could hardly see the edges and would only recognize them if they were pointed out.

e. **Fissure:** In this type, there is no central crater at all. Instead, giant cracks open in the ground and expel vast quantities of lava that spread far and wide to form huge pools that can cover almost everything around. When these pools of lava cool and solidify, the surface remains mostly flat. Since the source cracks are usually buried, there is often nothing “volcano-like” to see – only a flat plain.

3.



4. a. **Pahoehoe Flows:** A lava flow with a smooth-to-ropy surface.
b. **Aa Flows:** Lava flow that has a jagged, blocky surface.
c. **Block Lava:** Lava having a surface of angular blocks associated with materials having andesitic and rhyolitic compositions.
d. **Pillow Lava:** Basaltic lava that solidifies in an underwater environment and develops a structure that resembles a pile of pillows.

5. a. **Pyroclastic Materials:** The volcanic rock ejected during an eruption. Pyroclastics include ash, bombs and blocks.
 1. Bomb: A rounded piece of newly hardened lava that takes shapes while flying through the air.
 2. Block: A piece of lava that has sharp corners.
 3. Cinder: Bubbly rock formed by liquid lava cooling in the air.
 4. Pumice: Cinder so bubbly that it floats in water. (Note to teacher: you can find pumice stones to show to your Pathfinders in any bath & beauty section).
b. **Pyroclastic Flow:** A highly heated mixture, largely of ash and pumice fragments, traveling down the flanks of a volcano or along the surface of the ground.
c. **Lahar:** Mudflows on the slopes of volcanoes that result when unstable layers of ash and debris become saturated and flow down slope, usually following stream channels.
d. **Magma:** A body of molten rock found at depth, including any dissolved gasses and crystals.
e. **Plutons:** A structure that results from the emplacement and crystallization of magma beneath Earth's surface.
f. **Hot Spot:** Areas of volcanism, high heat flow, and crystal uplifting that are a few hundred kilometers, across.

6. An eruption begins when pressure on a magma chamber forces magma up through the conduit and out the volcano's vents. When the magma chamber has been completely filled, the type of eruption partly depends on the amount of gases and silica in the magma. The amount of silica determines how sticky (level of viscosity) the magma is and water provides the explosive potential of steam. Obstacles also influence the type of eruption. When the pipe is blocked by a stopple or an accumulation of pumice, the pressure in the pipe will build up very high resulting in an explosion.

When magma reaches earth's surface it is called lava. It may pour out in gentle streams called lava flows or erupt violently into the air. Rocks ripped loose from the inside of the volcano or torn apart by the gas may be shot into the air with the lava. The rocks blown out of a volcano are called pyroclastic rocks. The rock fragments fall back to earth in many different shapes and sizes.

7. Volcanic activity is classified by how often a volcano erupts. A volcano may be active, intermittent, dormant, or extinct. Active volcanoes erupt constantly. Intermittent volcanoes erupt fairly regularly. Dormant volcanoes are inactive, but not long enough to determine whether they will erupt again or not. Extinct volcanoes have been inactive since the beginning of recorded history.

8. Of the more than 800 active volcanoes that have been identified, most are located along the margins of the ocean basins – most notably along the within the circum-Pacific belt known as the Ring of Fire. This active zone includes a chain of continental volcanoes that consist primarily of composite volcanoes.

9. The Hawaiian Islands result from the movement of the Pacific plate over and apparently stationary hot spot. The island of Hawaii is still forming from the uplifting of mantle plumes under the hot spot. The island of Hawaii is the youngest of the Hawaiian islands, and the island of Kauai is the oldest of the larger islands in the Hawaiian chain.

10. Mount St. Helens is located in southwestern Washington State, about 50 miles northeast of Portland, Oregon. It is in the Cascade Range of Mountain. It was named in 1792 in honor of the Baron St. Helens. American Indians of the Pacific Northwest called it "Louwala-Clough" or "Smoking Mountain". The volcano was active in the mid-1800, but most people in this century did not see it as a menace. In fact, the mountain was snow-covered and very beautiful. The forest on it and around the bases was filled with wildlife. At the base of the volcano was Spirit Lake, a clear mountain lake that was very good for fishing and boating

In the spring of 1980, everything changed. First, there was a series of earthquakes and then came one or, maybe, two thunderous explosions. Mount St. Helens began to spew forth ash and steam. Two craters formed on the volcano and there were avalanches of snow and ice, darkened by ash. Over the next two months, the volcano continued to be active, simmering almost like a pot boiling on a stove. Then on May 18, 1980, the volcano suddenly erupted. Part of the volcano collapsed and became a huge

landslide that eventually covered an area of about 24 square miles. There was also a release of pent-up pressure from within the volcano. There was a huge blast of rock, ash and hot gases that devastated an area of about 230 square miles north of the volcano. To the south, the devastated area was much less. Scientists have calculated the blast started at about 220 miles per hour, but increased to about 670 miles per hour. The blast was heard as far away as Montana, Idaho Canada and California.

The eruption cost 57 lives and many injuries. Many buildings were buried and more than 200 houses and cabins were destroyed. Many tens of thousands of acres of prime forest, as well as recreational sites, roads and trails were destroyed or heavily damaged. More than 185 miles of highway and roads destroyed or extensively damaged. Four billion board feet of timber was damaged or destroyed and many animals, including deer, elk and bear were killed. Many small animals, such as rodents, frogs and crawfish managed to survive because they were below ground level or water surface. While the ash destroyed many crops in the area, the ash may provide beneficial chemical nutrients to the soil in the future.

Mount St. Helens information courtesy of U. S. Geological Survey/Department of the Interior.

11.

Psalm 104:31-32 (The Message)

31-32: The glory of GOD- - let it last forever!
Let GOD enjoy his creation! He takes on look at Earth and triggers an earthquake, points a finger At the mountains, and **volcanoes** erupt.

Psalm 144:5 (New International Version)

5: Part your heavens, O LORD, and come down; touch the mountains, so that they smoke.

Deuteronomy 4:10-13 (New International Version)

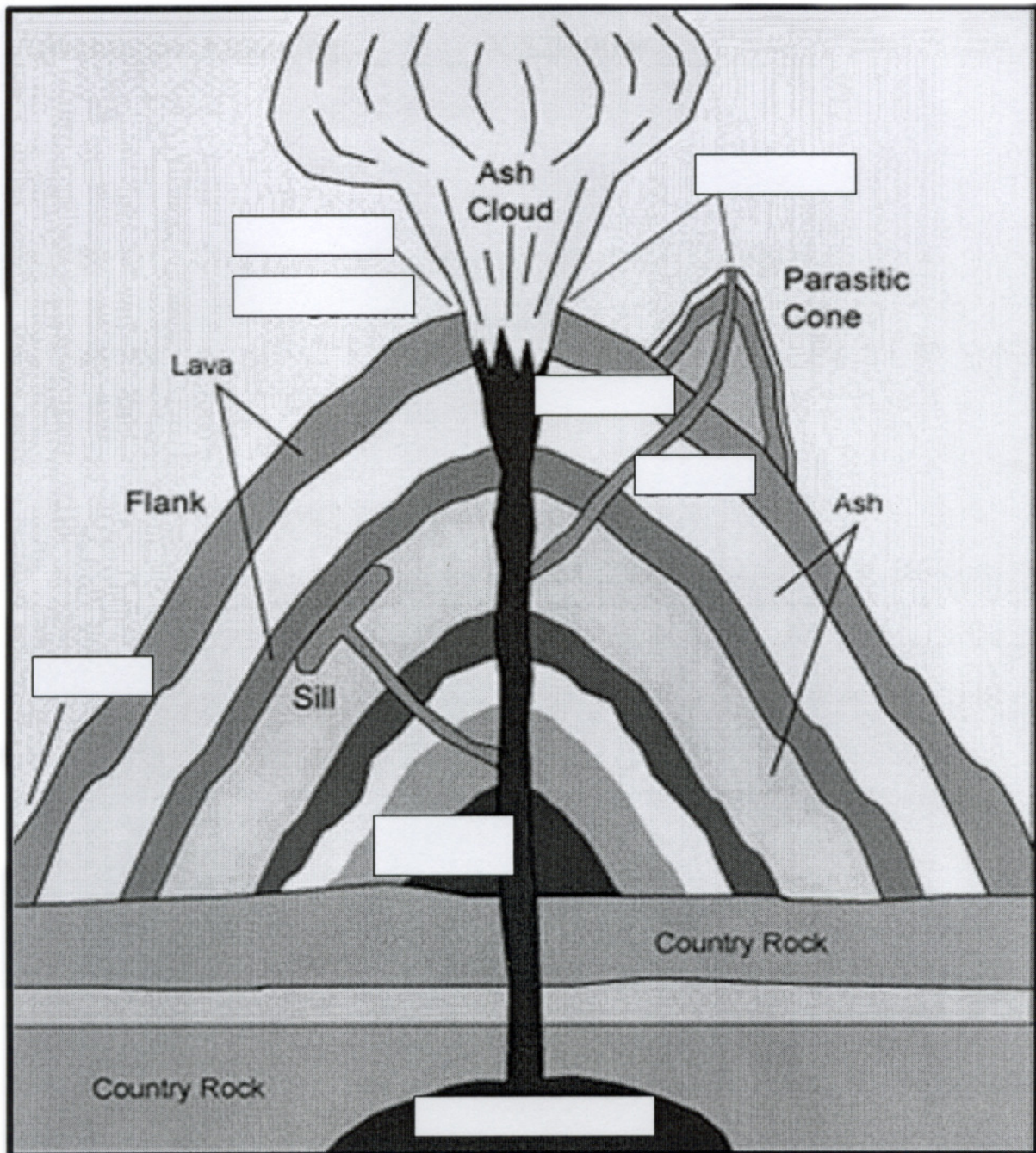
10: Remember the day you stood before the LORD your God at Horeb, when he said to me, "Assemble the people before me to hear my words so that they may learn to revere me as long as they live, in the land and may teach them to their children". **11:** You came near and stood at the foot of the mountain while it blazed with fire to the very heavens, with black clouds and deep darkness. **12:** Then the LORD spoke to you out of the fire. You heard the sound of words but saw no form; there was only a voice. **13:** He declared to you his covenant, the Ten Commandments, which he commanded you to follow and then wrote them on two stone tablets.

12. This website has several options for making models of volcanoes:



Volcanoes

Label the parts of the volcano that are missing labels by using the word bank below.



Word Bank:

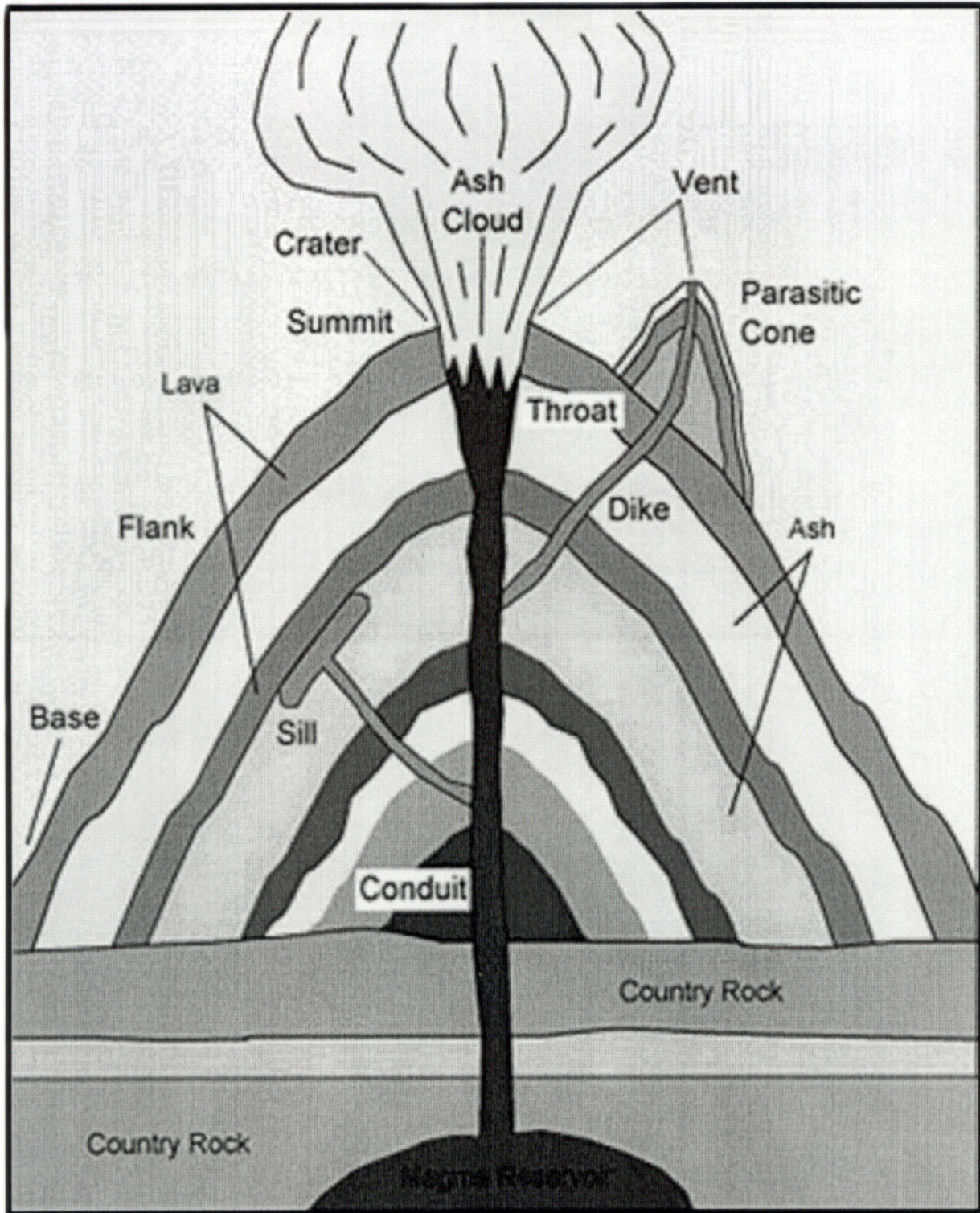
Crater
Summit
Base

Conduit
Dike
Throat

Vent
Magma Reservoir

Volcanoes Worksheet Answers

Label the parts of the volcano that are missing labels.



Kinds of Volcanic Lava

Draw a picture of each of the four kinds of lava and label each. Write a short description of each kind of lava, under the picture.

