

Mount St. Helens

Living with the Volcano that Came to Your Backyard

Lava Building Blocks



Grade Level: 6+

Learner Objectives:

Students will:

- Recognize the importance of lava dome growth in the construction of Mount St. Helens.
- Recognize that at Mount St. Helens lava flows are visible as large rounded mounds of rock, ridges that radiate from the volcano and loose fragments and ash from explosive events.
- Relate the general viscosity of lava flows to a type of volcano: shield, cinder cone, or stratovolcano.
- Make some generalized comparisons of lava flow behavior at Mount Rainier, Mount St. Helens, and Kilauea Volcano

Setting: Classroom

Timeframe: 40 minutes

- *Lava on the Run* – 40 minutes
- *Lava Flows or Barely Goes*—20 minutes
- *Student Lava Races*—10 minutes

Thanks and Acknowledgements:

This lesson plan is based on “Living with a Volcano in Your Backyard” curriculum developed by U.S. Geological Survey scientists at the Cascade Volcano Observatory and National Park Service educators at Mount Rainier National Park

Overview

Students investigate the influence of magma viscosity on the shape of a volcanic cone. Then, they explore the nature and motions of lava flows and learn about their importance as the building blocks of Mount St. Helens.

Materials:

Option 1 *Lava on the Run*

- “*Lava on the Run*” student page
- Graphic “*Three Types of Volcanic Cones*”
- Graphic “*Photographs of Lava Flows at Mount St. Helens*”
- Graphic “*Volcanic Rocks of Mount St. Helens*”

For each student group:

- Newspaper
- Cardboard 1x1 meter (3x3 foot)
- One sample (small half-filled paper cup) each of three household products (e.g., chocolate syrup, corn syrup, shampoo, oatmeal, jelly, ketchup, rubber cement, and a tube of toothpaste.)
- Specimens of lava rocks (optional)
- Paper cups
- Pencil
- Ruler
- Stopwatch
- Measuring spoon

Lava Building Blocks continued...



Teacher Background

Lava Domes Built the Foundation

On May 18, 1980, Mount St. Helens erupted in spectacular fashion that brought the volcano to the attention of the world. Few people realized that Mount St. Helens had long been the most active volcano in the Cascade Range. It has a rich and complex 300,000-year history and has produced both violent explosive eruptions of ash and pumice and quiet outpourings of lava. Mount St. Helens pre-1980 cone sits on a massive foundation constructed by earlier eruptions, numerous overlapping *lava domes* sandwiched between lava flows and layers of loose rock rubble. Using evidence in these lavas and other deposits, U.S. Geological Survey (USGS) scientists have documented dozens of major individual eruptions of the volcano.

The pre-1980 history of Mount St. Helens is strongly episodic. Volcanologists have recognized and named four episodes of volcanic activity, called "stages"-- Ape Canyon, Cougar, Swift Creek, and Spirit Lake, which were each separated by dormant intervals. The youngest stage, Spirit Lake, is further subdivided into six eruptive periods. Because the preservation of deposits and other geologic evidence is best for the youngest stages, the farther scientists look back in time the less detail they can infer for the history of volcanism at Mount St. Helens.

Materials:

Option 2 *Lava Flows or Barely Goes*

For each student group:

- 3 measuring cups
- 3 mixing containers or bowls
- 3 mixing utensils
- Corn starch
- Water
- Card board 1 x 1 meter (3 x 3 feet)
- Newspaper
- Photo samples of basalt, andesite, and dacite rocks and eruptions

Vocabulary:

Basalt, Andesite, Dacite, composite volcano, cinder cone, cone, crater, eruption, eruption column, glacier, lahar, landslides, lava, lava dome, lava flow, magma, magma chamber, pyroclastic flow, rockfall, rock rubble, shield volcano, silica, stratovolcano, vent, viscosity, volcano, volcanic gases

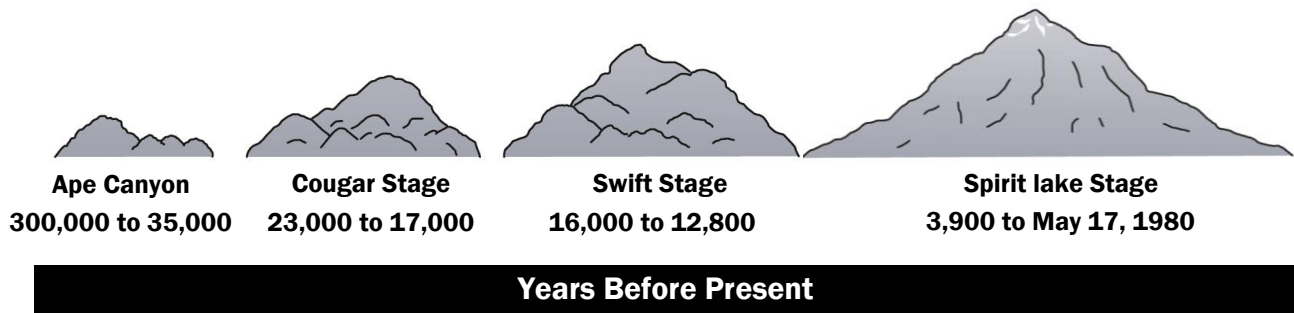
Skills:

Predicting, data collecting, recording, measuring, graphing

Lava Building Blocks continued...



Mount St. Helens' Profile Through Time



Ape Canyon Stage 300,000 to 35,000--Mount St. Helens Rises and Relocates

Mount St. Helens first known eruption took place 3 miles (5 km) southwest of its current location, about 300,000 years ago, when an eruption of thick dacite lava constructed Goat Mountain. During this stage, lava domes erupted in two distinct periods--one from 300 to 250 thousand years ago (ka) and a second from 125 to 35 ka. Over the next 250,000 years, the volcano's plumbing system gradually shifted to its present location. As periodic eruptions of thick pasty lava built the Mount St. Helens' foundation, it slowly transformed into a cluster of low-lying lava domes.

Major pumice layers in tephra set C clearly record voluminous plinian-type eruptions between 50,000 and 36,000 years ago. It contains at least two large-volume dacitic pumice layers, one of which is the largest volume of tephra known from Mount St. Helens. This layer has been identified in eastern Washington and Nevada as far as 300 and 700 km (185 to 435 miles) from the volcano.

Many Ape Canyon-age rocks were slowly cooked by volcanically heated groundwater, which chemically altered and weakened the rocks, indicating an extensive hydrothermal system existed during the latter part of the stage. Volcanism during this stage produced a small cluster of lava domes with maximum elevations of about 4,000 feet. The volcano was dormant from 35 to 23 ka.

Cougar Stage 23, 000 to 17,000—Mount Helens Builds Up and Falls Down

Mount St. Helens produced lava domes and flows, as well as explosive eruptions that ejected large volumes of ash and generated pyroclastic flow, which in turn generated lahars. These events increased the overall volume of the volcano, but a massive landslide also tore it apart. This landslide was at least twice as large as the landslide that triggered Mount St. Helens' 1980 eruption. It originated near Butte Camp and emplaced a 600 to 900 feet thick deposit on the south flank of the volcano, which dammed the Lewis River. A temporary lake formed and later burst through the dam, releasing a concrete-like slurry of mud and rock that flowed to the Columbia River and filled the lower Lewis River Valley with at least 200 feet of volcanic debris.

Lava Building Blocks continued...



The landslide was followed by a large explosive eruption with pyroclastic flows that buried the avalanche deposits with a 300-foot-thick sheet of dacite pumice. Continued explosive activity deposited ash sets "M" and "K" and more pyroclastic flows. The Cougar Stage culminated with the eruption of the largest lava flow in the history of Mount St. Helens. The vent for this andesite lava flow, at an elevation of 6,000 feet on the south flank of Mount St. Helens, marks the summit of the volcano at that time. The volcano was dormant from 17 to 13 ka.

Swift Creek Stage 13,000 to 11,000—Mount St. Helens Blows Up and Fans Out

Explosive eruptions produced two widespread ash layers, and three extensive fans of volcanic debris were emplaced from growing, unstable dacite lava domes. The Swift Creek fan, composed of pyroclastic flows and lahars, buried Cougar- age deposits on the south flank of Mount St. Helens. The Crescent fan consists of pyroclastic flows at least 600 feet thick on the west flank of the volcano that were derived from the Crescent lava dome. The Cedar Flats fan completely filled the ancestral valley of Pine Creek and spilled into the Lewis River at Cedar Flats. It was at least 300 feet thick in the Cedar Flats area. This fan is dominated by lahar deposits, but also contains pyroclastic material produced by collapses of lava domes.

All three fans are associated with the deposition of ash set "S" dated at 13 to 12.5 ka. The Swift Creek Stage culminated with deposition of ash set "J" at about 11.5 to 11 ka. At the end of Swift Creek time, Mount St. Helens consisted of a cluster of dacite domes with elevations as high as 7,000 feet. The volcano was dormant from 11 to 3.9 ka.

Spirit Lake Stage 3,900 to present—Mount St. Helens Fuji-like Shape Forms

The bulk of the pre-1980 edifice of Mount St. Helens was constructed by eruptions during the Spirit Lake Stage. Excellent preservation of deposits, as well as numerous ages from radiocarbon and tree-ring dating, provides considerable detail for this stage. Volcanism was intermittent, with lulls on the order of a few to about 600 years. As in earlier stages, mostly dacite erupted, but significant amounts of basalt and andesite were also erupted. The Spirit Lake Stage is subdivided into six eruptive periods.

Smith Creek Eruptive Period 3,900 to 3,300: The primarily ash-producing eruptions of this period did not significantly change the volcano's shape. Two periods of activity, 3.90 to 3.85 ka and 3.5 to 3.3 ka, deposited set "Y" ashes. The second period was initiated with an eruption that produced "Yn" ash. This eruption, possibly the most voluminous in Mount St. Helens' history, was about four times larger than the 1980 eruption. Late in Smith Creek time, huge lahars swept down the Toutle River, and some probably reached the Columbia River.

Lava Building Blocks continued...



Pine Creek Eruptive Period 2,900 to 2,550: Mount St. Helens erupted ash and produced pyroclastic flows and dacite domes, and two small debris avalanches occurred on its north flank. Repeated collapse of hot, growing lava domes produced an extensive, broad fan of volcanic debris up to 600 feet thick on the south flank of the volcano. Similar deposits on the north flank can still be found as far downstream as the town of Toutle. Pine Creek-age dacite domes exposed in the walls of the crater left by the 1980 eruption show that at the end of Pine Creek time, the volcano was a cluster of lava domes with a maximum elevation of about 7,000 feet.

Castle Creek Eruptive Period 2,550 to 1,895: The Castle Creek Eruptive Period produced many lava flows and domes, pyroclastic flows, and ash. Andesite lava flows and ash erupted from the summit were emplaced on all flanks of Mount St. Helens between 2.55 and about 2.50 ka. A lull of about 300 years followed, and volcanism resumed at about 2.2 ka with eruption of andesite lava flows on the volcano's north flank. Several thick dacite lava flows and domes, pyroclastic flows and ash, and lahars were produced at 2.0 ka. Castle Creek activity culminated with eruption of three groups of fluid basalt lava flows that poured down all flanks of the volcano as far as 8 miles. The Cave Basalt, erupted at 1.895 ka, was the most recent of these. Castle Creek lavas transformed the Pine Creek-age cluster of domes into a classic cone-shaped composite volcano, with a summit elevation of about 8,500 feet.

Sugar Bowl Eruptive Period 1,200 to 1,150 [A.D. 850 to 900 radiocarbon dates]: During the Sugar Bowl Eruptive Period, three lava domes were built on the flanks of Mount St. Helens. Explosive eruptions associated with growth of the Sugar Bowl Dome produced two "lateral blasts" that affected an area about one-tenth as large as that of the lateral blast in the 1980 eruption. Ash layer "D" and lahars were also emplaced. The Sugar Bowl period was short lived, produced a small volume of volcanic materials, and did not significantly change the appearance of the volcano.

Kalama Eruptive Period (A.D. 1479 to 1720)--Activity during this period produced large-volume dacite ashes, pyroclastic flows, domes, lahars, and andesite lava flows. Mount St. Helens added about 1,000 feet of elevation and attained its pre-1980 form during the Kalama Period.

The early Kalama phase began in 1479 with a large pyroclastic eruption that deposited dacite ash layer "Wn." In 1482, a smaller eruption produced ash layer "We." Over the next 10 to 20 years, a number of lava domes grew in the volcano's crater and were disrupted by explosive eruptions. Lahars and pyroclastic flows associated with early Kalama eruptions are abundant on the volcano's west and south flanks.

The middle Kalama phase began about 1510 with eruption of andesite as pyroclastic flows (which generated hot lahars), a few lava flows, and ash set "X." The middle phase peaked about 1535 with eruption of the many thick andesite lava flows prominent on all flanks of Mount St. Helens, including the Worm Complex flows, and ended by 1570.

Lava Building Blocks continued...



The most significant event of the late Kalama phase was growth of a large dacite dome at the summit. The Summit Dome took nearly 100 years to grow (1620 to 1720) and gave Mount St. Helens its pre-1980 form. During growth, it shed material as pyroclastic flows and lahars on all flanks of the volcano. Mount St. Helens acquired its pre- 1980 cover of glaciers as a result of growth of the Summit Dome.

Goat Rocks Eruptive Period (A.D. 1800– 1857)--The Goat Rocks Period was short and relatively small. An explosive eruption in 1800 produced ash layer "T" and was followed in 1801 by an andesite lava flow, called the "Floating Island," on Mount St. Helens' north flank. Eruptions observed intermittently from 1831 to 1857 produced ash and the Goat Rocks Dome, whose growth also resulted in a small fan of volcanic debris and lahars.

The last significant eruption of Mount St. Helens before 1980 is generally considered to have occurred in 1857. Minor explosions reported in 1898, 1903, and 1921 were probably steam-driven and not magmatic (molten rock) eruptions. Eruptions of the Goat Rocks Period did not significantly change the appearance of Mount St. Helens, but they added the final pieces to the edifice and set the stage for the 1980 eruption.

Lava Building Blocks continued...



Silica influences lava viscosity and overall shape of the volcano

Silica content is the principal control upon the **viscosity** of magma. Silica molecules form a strong bond that permits entrapment of volcanic gases and promotes explosive volcanic eruptions. Low-silica magmas allow rapid escape of gases and low-explosivity eruptions. Other factors that control magma viscosity include the magma's temperature, gas and water content, and the amount of crystals in the magma. The massive **shield volcanoes** of Kilauea and Mauna Loa, in Hawai'i, contain 50 percent silica in its magma, whereas the **stratovolcano** of Mount Rainier has silica content of nearly 60 percent. Mount St. Helens has the highest average silica content at 64 percent. For more information about magma, visit the Magma Mash activity

Side Bar #1 Viscosity

This is the resistance of a material (usually a fluid) to flow. Examples higher and lower viscosity would be the higher resistance to flow of cake batter compared to water.

How do lava flows form on steep-sided volcanoes?

Volcanic eruptions often begin with the release of steam and other **volcanic gases** that have been trapped within the **magma** during its long ascent from the **magma chamber**. The real mountain building begins after most volcanic gases have escaped. Inside the **vent**, molten lava rises and subsides repeatedly. The lava within the vent eventually rises high enough to spill over the **crater** rim as a glowing lava flow, often with temperatures that range between 900-1100 degrees C (1,650 to 2,000 degrees F). The outside of the lava flow cools and hardens into a rubbly crust within minutes, while the interior of the flow remains hot and gooey and continues to spill downhill. But, that is not the end of the story.

Pyroclastic flows, avalanches of hot rock and gas

Many lava flows that issue from steep-sided volcanoes break up into blocks and rubble that avalanche down valley accompanied by a billowing cloud of rock dust and steam. **Pyroclastic flows** can also form from the collapse of **eruption columns**. The swift melting of snow and ice by pyroclastic flows has the potential to create **lahars** that travel great distances beyond the slope of the mountain and threaten nearby communities. Geologists speculate that, at steep-sided Cascade volcanoes, some of the **rock rubble** found sandwiched between lava flows originated as pyroclastic flows.

Lava Building Blocks continued...



Not all volcanoes are created equal

While there are many ways to classify volcano types, one very simplistic and common classification system separates all volcanoes into three types based upon overall shape— shield volcanoes, **cinder cones**, and stratovolcanoes, sometimes known as **composite volcanoes**. The overall shape of a volcano provides clues about the texture and chemical content of the lava that formed it. Magma erupted from shield volcanoes produces fluid lava that spreads quickly and thinly for great distances across the surface. This produces a gentle slope, similar in shape to the round shields used by Roman soldiers. Shield volcanoes have large foundations that cover massive areas. A stratovolcano consists of accumulations of viscous lava flows and rock rubble. Their slopes are much steeper than slopes of shield volcanoes. The type of magma that creates a cinder cone is similar to that of shield volcanoes. During an eruption, expanding gases inflate small pieces of rock called cinders, which accumulate into a pile forming a bubbly cone. Many cinder cones also contain small lava flows. The graphic “*Three Types of Volcanic Cones*” depicts examples of these volcanic cones.

Mount Rainier and Mount St. Helens—some comparisons

Mount Rainier and Mount St. Helens have very different ages (oldest rocks 500,000 years ago and 300,000 years ago, respectively) and eruption styles, which explains their difference in shape and size. Mount Rainier’s tendency to erupt more lava than tephra is one reason why it has been able to grow to such a great height. On the other hand, Mount St. Helens produces a tremendous amount of tephra that is blown away from the volcano and does not contribute to the volcano’s cone. Lava at Mount St. Helens can be so viscous that it appears to squeeze out of the ground like toothpaste from a tube. This creates a muffin-shaped feature called a **lava dome** that grows over the vent. Later explosive eruptions will destroy earlier lava domes and prevent the volcano from growing to great heights.

Lava Building Blocks continued...



Procedure

What to do Before Class Begins:

- ◆ Choose three products to represent lava samples. Products should have different compositions and textures and viscosities (chocolate syrup, corn syrup, shampoo, oatmeal, jelly, ketchup, rubber cement, etc.). Place each of these materials in small containers to give to each lab group. Use paper cups or other containers.

Introducing Viscosity

1. Briefly review the different types of volcanoes. Use the “*Three Types of Volcanoes*” graphic to compare the shapes and sizes of shield, cinder cones, and stratovolcanoes.
2. Introduce the term viscosity and describe how the viscosity of lava will determine eruptive style and the type of volcano produced.

Lava Building Blocks continued...



Option 1: “Lava On The Run”

Students test the viscosity of three “lava samples” and draw conclusions about the type of volcano that might result. Provide each student with a “*Lava on the Run*” student page.

1. Divide the class into groups of three or four persons. Each team member should have at least one role in the experiment, such as recorder, timekeeper, marker and measurer, and sample pourer.
2. Students spread newspaper or plastic sheeting over activity areas to ensure easy cleanup.
3. Students use a marker to draw a start line at the top of the cardboard and then prop the cardboard against an object at a steep angle.
4. Provide the lava flow samples to each group.
5. Instruct students to examine the lava samples.
6. On the student page, students write their prediction about which sample is the most viscous (slowest flowing) and least viscous (fastest flowing).
7. Instruct students to measure one tablespoon of sample and hold it above the start line ready to pour when the *timekeeper* says go. Pour the sample onto the cardboard. After ten seconds, the timekeeper will say stop, and the *marker* will draw a line where the “lava” was at that time. The *measurer* will determine the distance traveled during that time. The *recorder* writes the distance on the student page.
8. Students repeat the process with all samples. Average the results of each “lava” sample for all groups.
9. Instruct each group to graph the results showing which sample is more viscous or resistant to flow in the experiment.
10. See “*Concluding Experiments Options 1, 2 and 3*” on page 13.

Lava Building Blocks continued...



Option 2: “Lava Flows or Barely Goes”

Students will make three types of “lava”, conduct “lava races”, observe characteristics and differences between the lava types and be able to identify what lava creates what type of eruption.

1. Ask students which words they would use to describe lava? Expect a lot of answers like “red” and “flowing” and “runny”. Explain that there are actually many different types of lava (if you have them, hold up volcanic rocks to demonstrate), and that those differences are caused by different amounts of silica, which influences their viscosity.
2. Divide the students into three groups (alternately have each group make all three lavas). Give them each a measuring cup and a mixing container. Explain that the corn starch will represent silica levels, and the water represents the other minerals that are in lava.
3. Have Group 1 mix 50% water, 50% corn starch in their container (1 part water to one part flour). Have Group 2 mix 58% corn starch and 42% water (ROUGHLY 3 parts flour to 2 parts water—test this!). Have Group 3 mix 65% corn starch and 35% water (roughly 2 parts corn starch to one part water—test this!). Remind them to mix the “lava” well.
4. Have each group to predict which lava they think will win the race, and why.
5. Set up card board ramps with newspaper at the bottom of them to prevent lava messes. Have a representative of each group pour their “lava” down the ramp on the count of three.
6. Identify which lava went the fastest and the farthest and ask students to describe how each type of lava moved.
7. See “*Concluding Experiments Options 1, 2 and 3*” on page 13.

Lava Building Blocks continued...



Option 3: “Student Lava Races”

Students will observe differences in viscosity between basalt, andesite and dacite lava by conducting a race where their walking style mimics the type of lava.

1. Review the three types of lava Mount St. Helens has erupted—basalt, andesite and dacite. All three have similar chemical compositions, but different amounts of silica that influences their viscosity.
 - Basalt
 - Least amount of silica: 48-52%
 - Thinnest, runniest lava
 - Flows like honey
 - Dacite
 - Most silica: 62-68%
 - Thickest lava
 - Flows like peanut butter
 - Andesite
 - Silica: 52-62%
 - Between basalt and dacite
2. Explain that they will be conducting a lava and establish a starting line and finishing line, separated by at least 25 feet.
3. Assign a lava type to each student you want to participate in the race. A minimum of three students are required, but an entire class can participate.
4. Demonstrate how each lava type must walk: Basalt takes normal walking steps; Andesite walks with their inner knees touching together at all times; Dacite walks with their knees and ankles together (must shuffle like their shoelaces are tied tightly together)

Lava Building Blocks continued...



Concluding Experiments Option 1, 2 and 3

1. Discuss results with the class. Address similarities and differences among group results.
 - a. Did each group mark the same specimen as most or least viscous? Explain their answers.
 - b. Which specimen might represent each type of volcano?
 - c. How did slope play a role in the results?
 - d. How would shape or slope of a volcano and changes in silica content affect the volcano?
Discuss how each consecutive lava flow adds height to the volcano.
2. Display the graphics *“Three Types of Volcanic Cones,”* *“Photographs of Lava Flows at Mount St. Helens.”* Ask students to identify the samples that would build a shield and stratovolcano.
3. Use the graphic *“Elevator Overview”* to show the pathway that the “elevator” will be following. Introduce the concept of mantle melting, magma rising into the magma chamber and erupting through the magma conduit.
4. Distribute *“Riding the Magma Elevator”* narrative to every student. For each level, display the appropriate graphic.
5. Read or paraphrase, or ask a student to read the narrative for each level of the magma rising process. At each level, review whether pressure is increasing or decreasing and why.
6. For assessment, at the end of the narrative, ask students for a quick review of what processes occur at each level shown on the graphics.

Lava Building Blocks continued...



Adaptations

- ◆ Conduct “*Lava on the Run*” as a classroom demonstration.
- ◆ ***Illustrating volcano types using simple foods***—Display to the class a chocolate chip, a chocolate kiss, and a wafer cookie. The chocolate kiss represents a steeply sloped stratovolcano, or composite volcano; the chocolate chip represents a cinder cone; the wafer illustrates the broad slope of a shield volcano. Ask students which type of volcano each of the foods represents. *Used courtesy of Dr. Robert Lillie, Oregon State University*

Extensions

- ◆ For older students, assign Internet or library research concerning volcano growth rates. Instruct students to examine the life histories of other Cascade volcanoes.

Assessment

For assessment, instruct students to show results on the student page and on the graph. Students should demonstrate ability to follow instructions on the student page, record results and graph their data. Look for evidence that students understand the following concepts: that the type of lava material erupted from a volcano influences the volcano’s shape; that Mount St. Helens is a stratovolcano; that lava domes are the principal building blocks of Mount St. Helens; that lava flows are visible as thick ridges that radiate from the volcano and as thin ledges within the volcanic cone. Assess application to real-world situations by assigning further class interpretation of photographs of volcanoes on the graphics pages and of photographs in books and websites. Ask questions about how viscosity of magma affects the shape of volcanoes near your community.

References

Bohan, P., Weiss, H., Herrick, J., White, A., 2005-2007, Mount St. Helens National Volcanic Monument Student Rock Program, 1-10 p

Clynne M.A., Calvert A.T., Wolfe E.W., Evans R.C. Fleck R.J. Lanphere M.A., 2008, The Pleistocene Eruptive History of Mount St. Helens, Washington, from 300,000 to 12,800 Years before Present, U.S. Geological Survey Professional Paper 1750, 611 p.

Clynne M.A., Ramsey D.W., Wolfe E.W., 2005, Pre-1980 Eruptive History of Mount St. Helens, Washington, U.S. Geological Survey Fact Sheet 2005-3045, 1-4 p.

Team Names: _____



Lava on the Run - Part 1

During this activity, you will test the viscosity of three lava-like products and draw conclusions about the type of volcano they might form.

1. Choose roles for each team member— recorder, timekeeper, marker and measurer, and sample pourer.
2. Spread newspaper or plastic sheeting over activity areas for easier cleanup.
3. Use a marker to draw a start line at the top of the cardboard and, then prop the cardboard against an object at a steep angle.
4. Examine the three samples provided to your group (chocolate syrup, corn syrup, shampoo, oatmeal, jelly, ketchup, rubber cement, etc.)
5. On the student page, write your prediction about which sample is more viscous and will flow downhill the slowest, and which sample is least viscous and will flow fastest.
6. Measure 1 tablespoon of sample and hold it above the start line ready to pour when the *timekeeper* says go. Pour the sample onto the cardboard. After 10 seconds, the timekeeper will say stop, and the *marker* will draw a line where the “lava” was at that time. The *measurer* will determine the distance traveled during that time. The *recorder* writes the distance on the student page.
7. Perform each lava run twice. Average the results of each sample and record it.
8. On the back of this page, draw a graph of your results. Write on your graph which lava-like samples are more viscous (resistant to flow).

Team Names: _____



Lava on the Run - Part 2

Predictions:

Which sample will travel the greatest distance in 10 seconds? _____

Which sample will travel the shortest distance in 10 seconds? _____

Sample #	Distance (mm) 1st time	Distance (mm) 2nd time	Average

1. List factor(s) which control distances traveled by your lava-like flows.

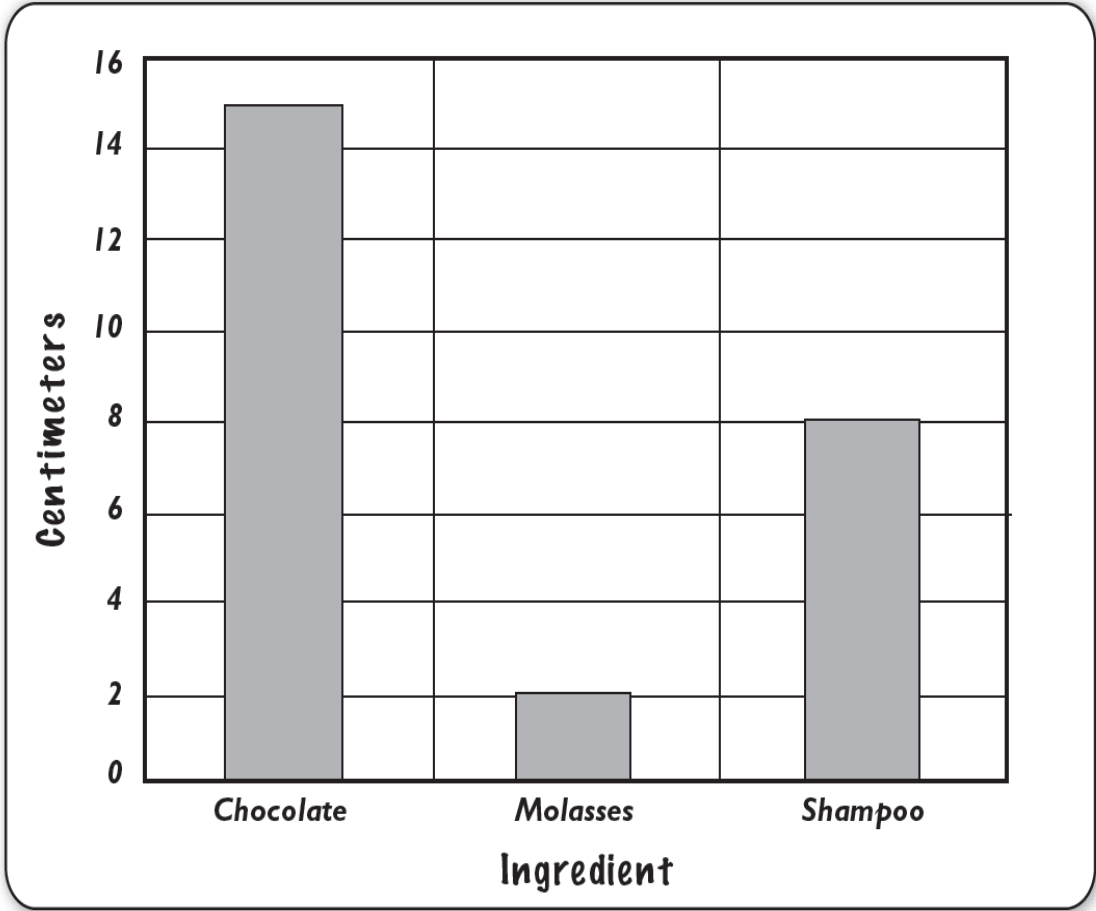
2. List which products most closely resemble the behavior of lava flows on a shield volcano and a stratovolcano. Sample # Average Distance (mm) 1st time Distance (mm) 2nd time

Teacher Page

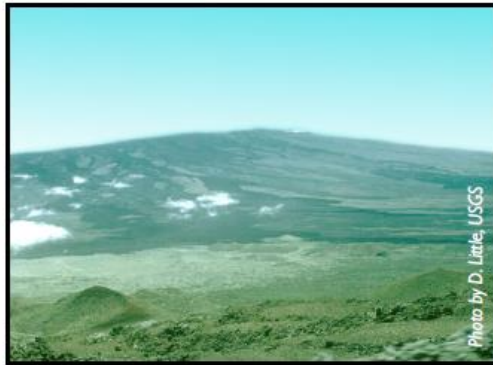


Lava on the Run - Sample Graph

Lava on the Run

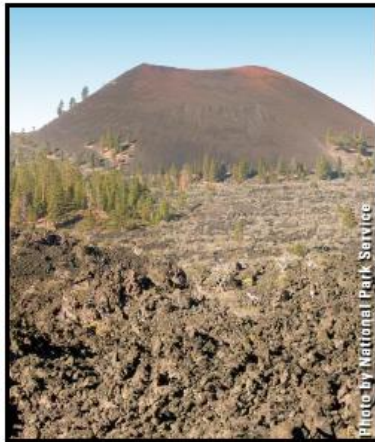


Three Types of Volcanic Cones



Shield Volcano

View of the northwest flank of Mauna Loa Volcano from the south side of Mauna Kea Volcano, Hawaii.



Cinder Cone

Lava Butte Cinder Cone, Oregon, from Highway 97

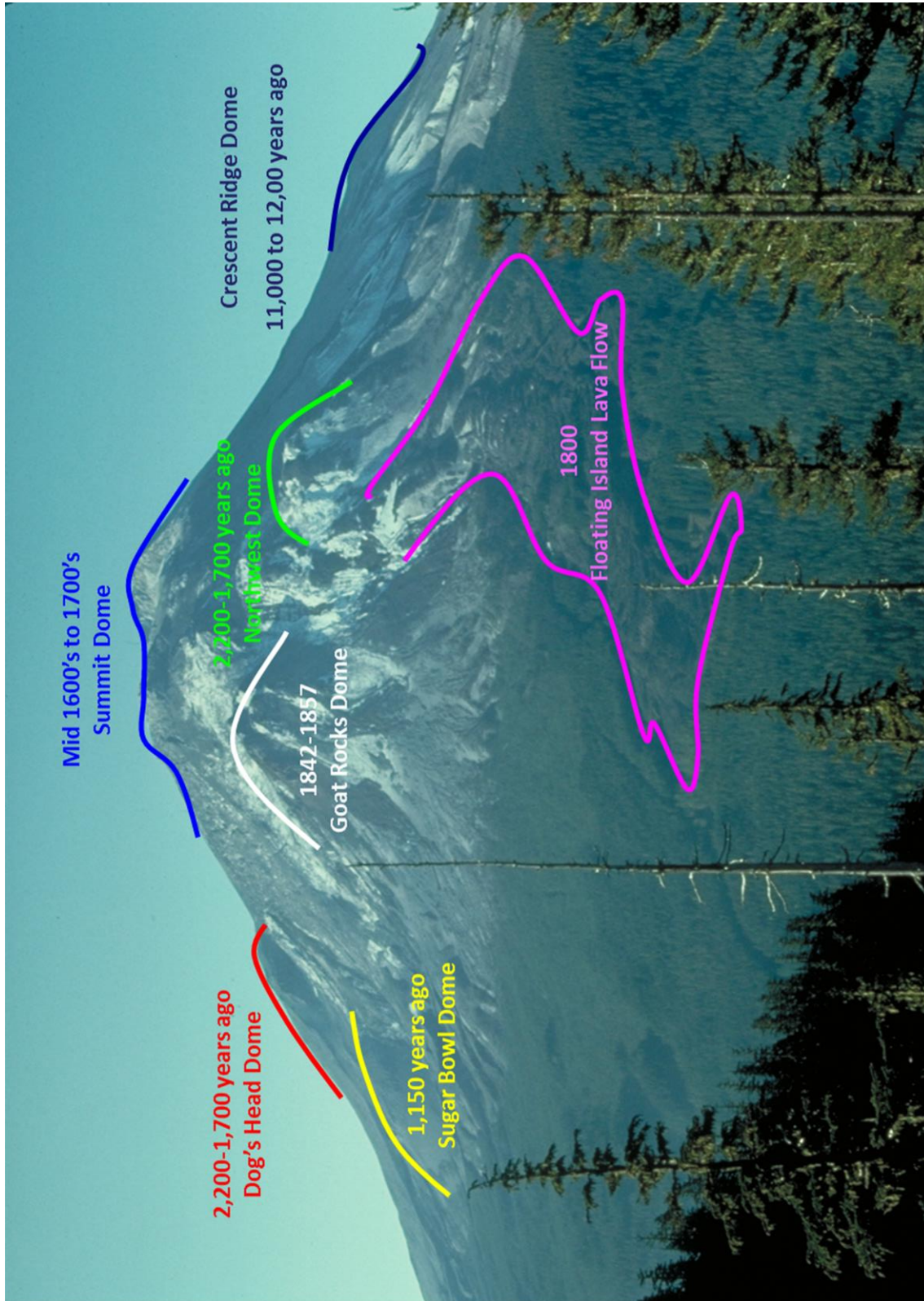


Stratovolcano (Composite Cone)

South side of Mount Rainier from Paradise Ridge

Graphics

Photographs of Lava Flows at Mount St. Helens







Graphics

Basalt Lava Rock

