VOLCANOES!!

Talk to your tablemates:

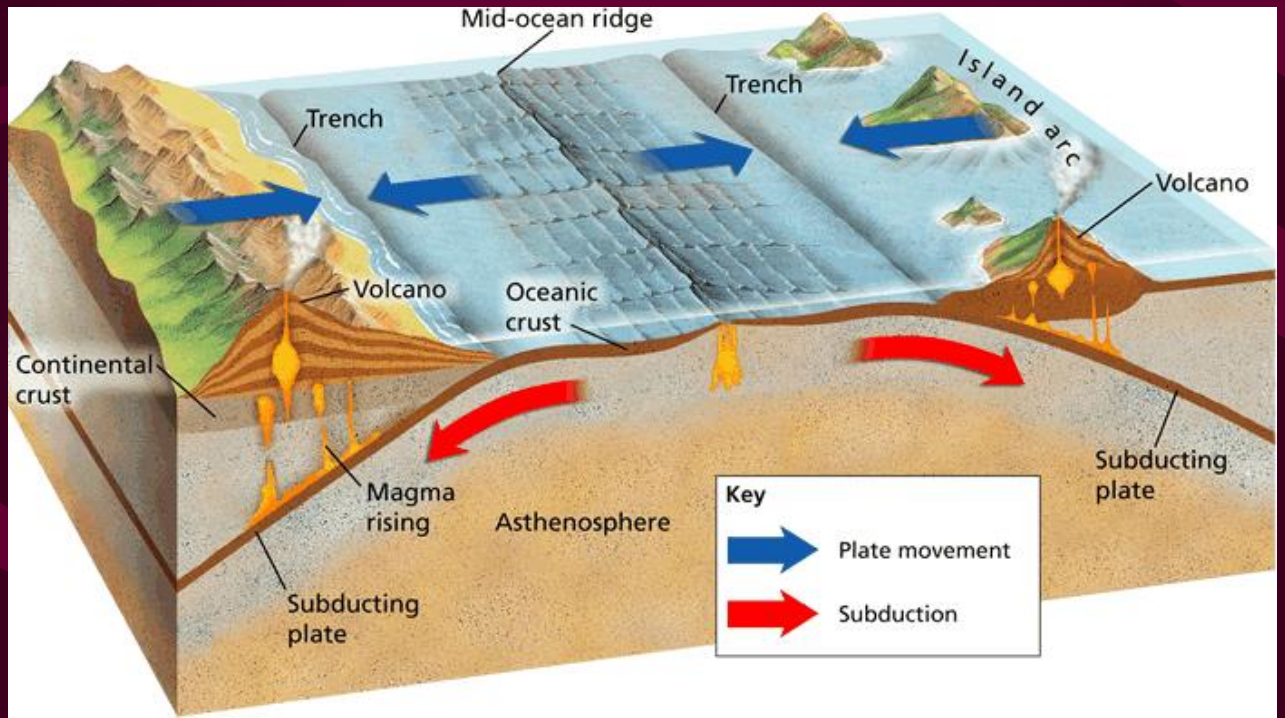
How are volcanoes formed?

Volcanoes and Plate Boundaries

- Volcanic belts form along the boundaries of Earth's plates.

Volcanoes and Plate Boundaries

•Volcanoes *often* form where two oceanic plates collide or where an oceanic plate collides with a continental plate. In both situations, an oceanic plate sinks through a trench. Rock above the plate melts to form magma, which then erupts to the surface as lava.

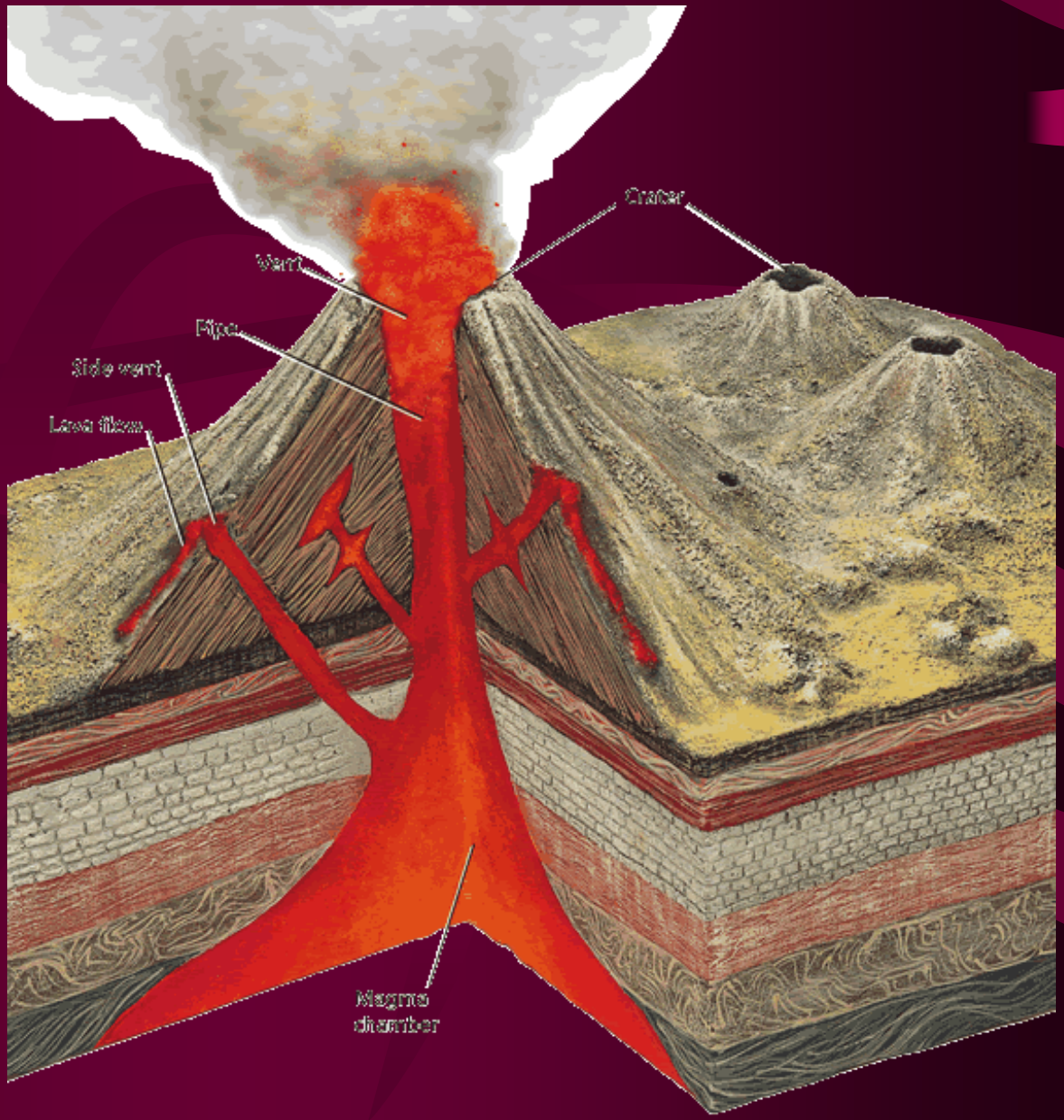


What is a Volcano??

A volcano is where magma breaks through the surface of the earth. There are three types of volcanoes. Each volcano is different based on how they form, the kind of lava it contains and how it erupts.

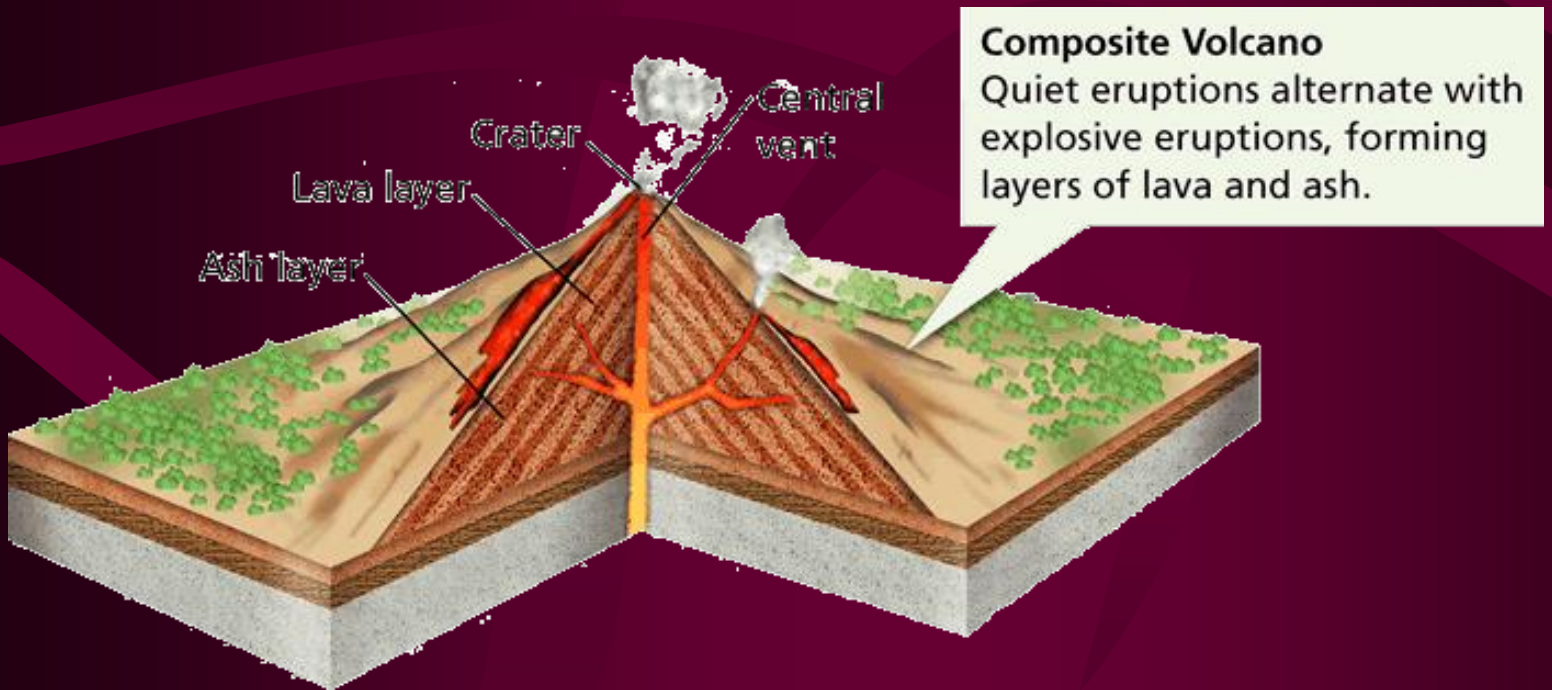
Magma Reaches Earth's Surface

- When a volcano erupts, the force of the expanding gases pushes magma from the magma chamber through the pipe until it flows or explodes out of the vent. Magma is called lava when it reaches the Earth's surface.



COMPOSITE VOLCANOES!

- Also called Stratovolcanoes
- These volcanoes form over subduction zones
- Quiet eruptions alternate with explosive eruptions form alternating layers of lava and ash.



COMPOSITE VOLCANOES!

- Composite volcanoes typically have very violent eruptions with large pyroclastic flows (explosive eruption that hurls out a mixture of hot gases, ash, cinders, and bombs) and ash clouds

- The magma in these volcanoes is very thick, causing the build up of gasses. This pressure is what "pops" off the top of the volcano, causing huge eruptions

This is a composite volcano.

Notice the steep sides and ash erupting from the vent.

Mt. St. Helens and Mt.Pinatubo are composite volcanoes

This is the 1991 eruption of Mt. Pinatubo in the Phillipines. It is a composite volcano.

Notice the huge ash cloud.

Ash clouds can:

-lower avg. global temperatures

-affect the weather

- cause engine failure in airplanes

ASHFALL FOSSIL BEDS!

A huge volcano in southeast Idaho erupted 11 million years ago, and the ash was carried in the atmosphere and buried animals living near a watering hole in Nebraska. The picture below is a rhinoceros that suffocated to death and was buried by the ash. Ashfall is sometimes called “Pompeii of the Plains”.

Photo by Andria Skaff

Composite volcanoes of the Pacific Northwest

-Caused by the Juan de Fuca plate subducting under the North American plate

Most famous is Mt. St. Helens, which erupted in May of 1980

BEFORE

DURING

Mt. St. Helens

AFTER

Lahars = Mudflows

One dangerous side effect of explosive eruptions are lahars, or mudflows.

Car destroyed by lahars from Mt. St. Helens eruption.

Here you can see the lahars from Mt. St. Helens

POMPEII!

Mt. Vesuvius erupted in 79 A.D burying the towns of Pompeii and Herculaneum near Naples, Italy.

Looking down a main street in Pompeii towards Mount Vesuvius.

Pompeii!

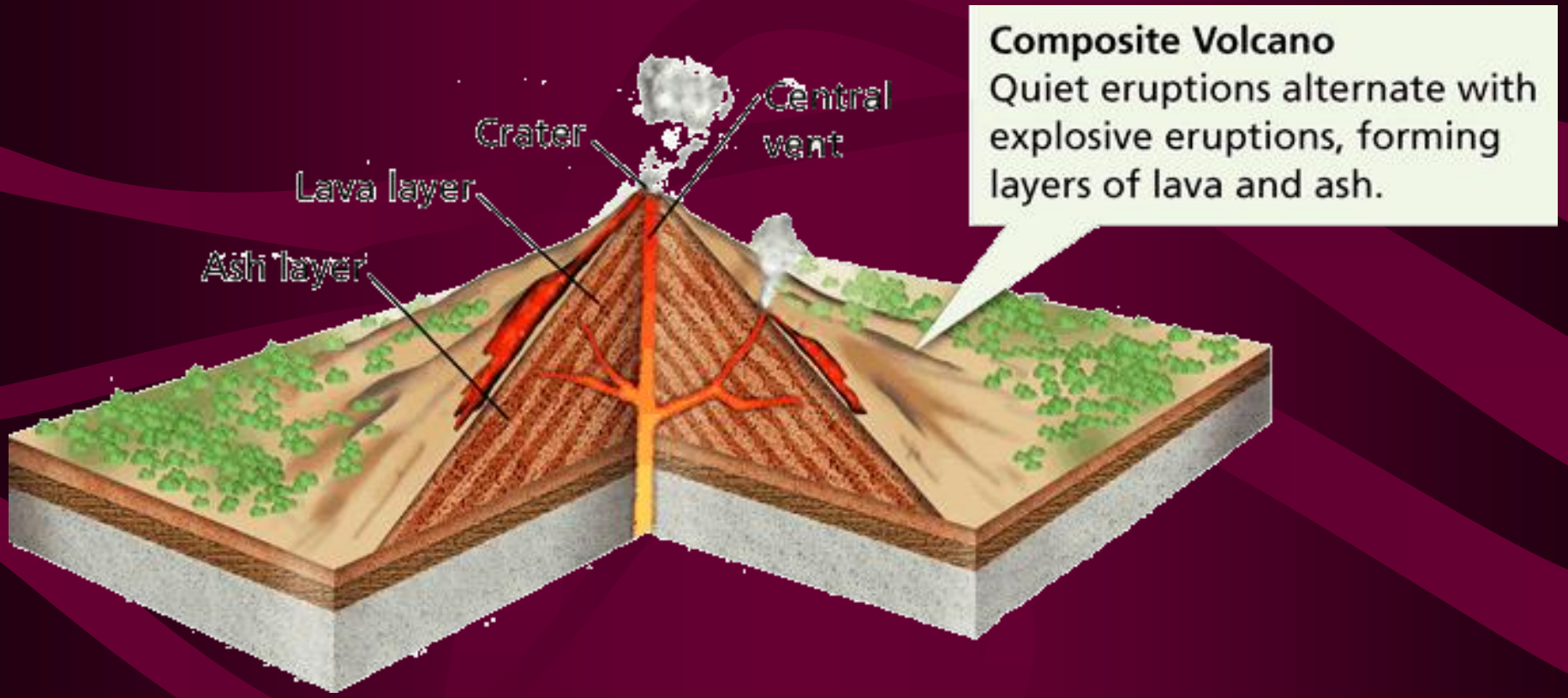
The 79 A.D. eruption of Mount Vesuvius came 17 years after a violent earthquake caused extreme damage and killed many people in Pompeii. Below is a body cast and artifacts from the excavation of Pompeii.

Body casts are made when archaeologists pour liquid plaster into the hollows left in the ash where the bodies had decomposed.

Many died here trying to flee. Unfortunately, the city wall blocked their escape.

Notice the propped up person at the end. There were animal body casts as well (hard to see in this picture).

Let's Draw a COMPOSITE VOLCANO!

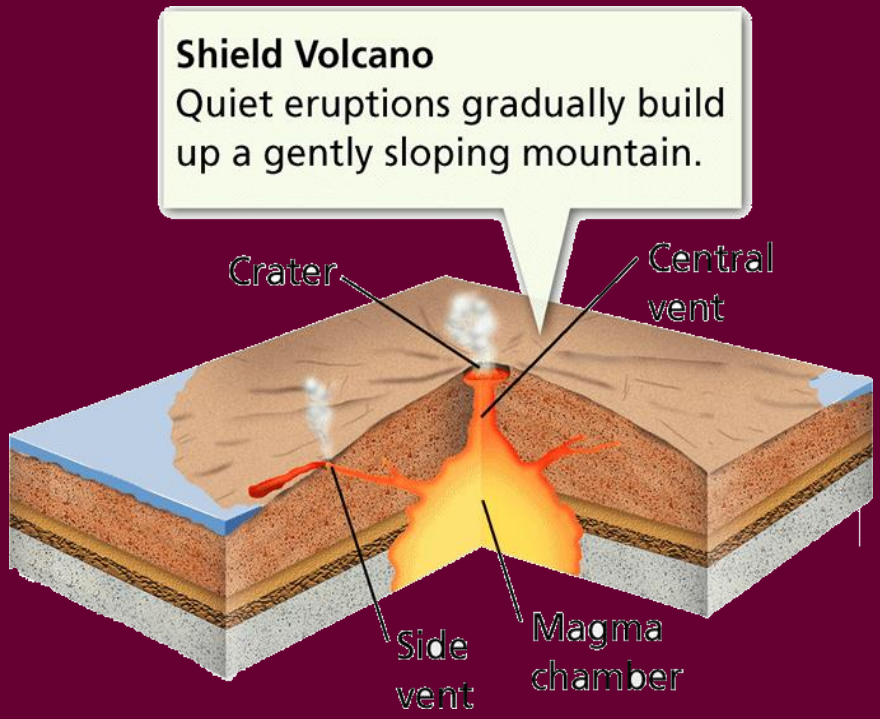


Talk to your table

What would you have done if you were a resident of Pompeii?

SHIELD VOLCANOES!

- Form over hot spots
- Quiet eruptions gradually build up to form a gently sloping mountain.



SHIELD VOLCANOES!

-Their lava is very fluid because the gasses can escape more easily from the magma.

-Because the lava flows quickly it creates a broad, gently sloping volcano that resembles a Hawaiian warrior's shield.

This is a shield volcano.

Notice the gentle slopes.

Examples:

Kilauea & Mauna Loa in Hawaii

HOT SPOTS!

- a heat source deep within the mantle, 100-200 km across, and persistent for millions of years

- thought to be the result of a rising plume of magma from the mantle

- an example is Yellowstone National Park and the Hawaiian Islands

Shield volcanoes form over hot spots.

HOT SPOTS!

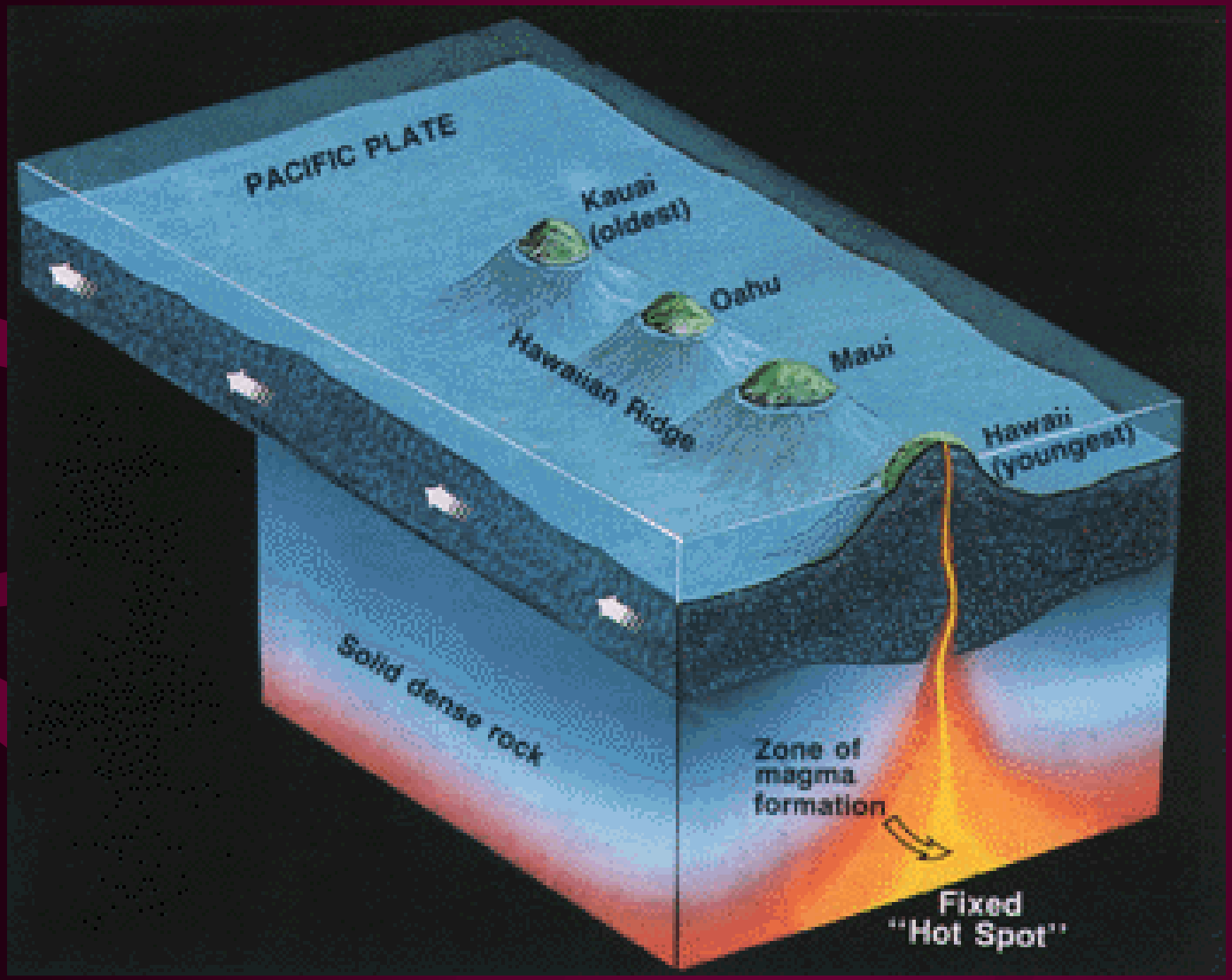


Diagram of the Hawaiian Islands and the associated hot spot

The **Galapagos Islands** were also created over a hot spot!!

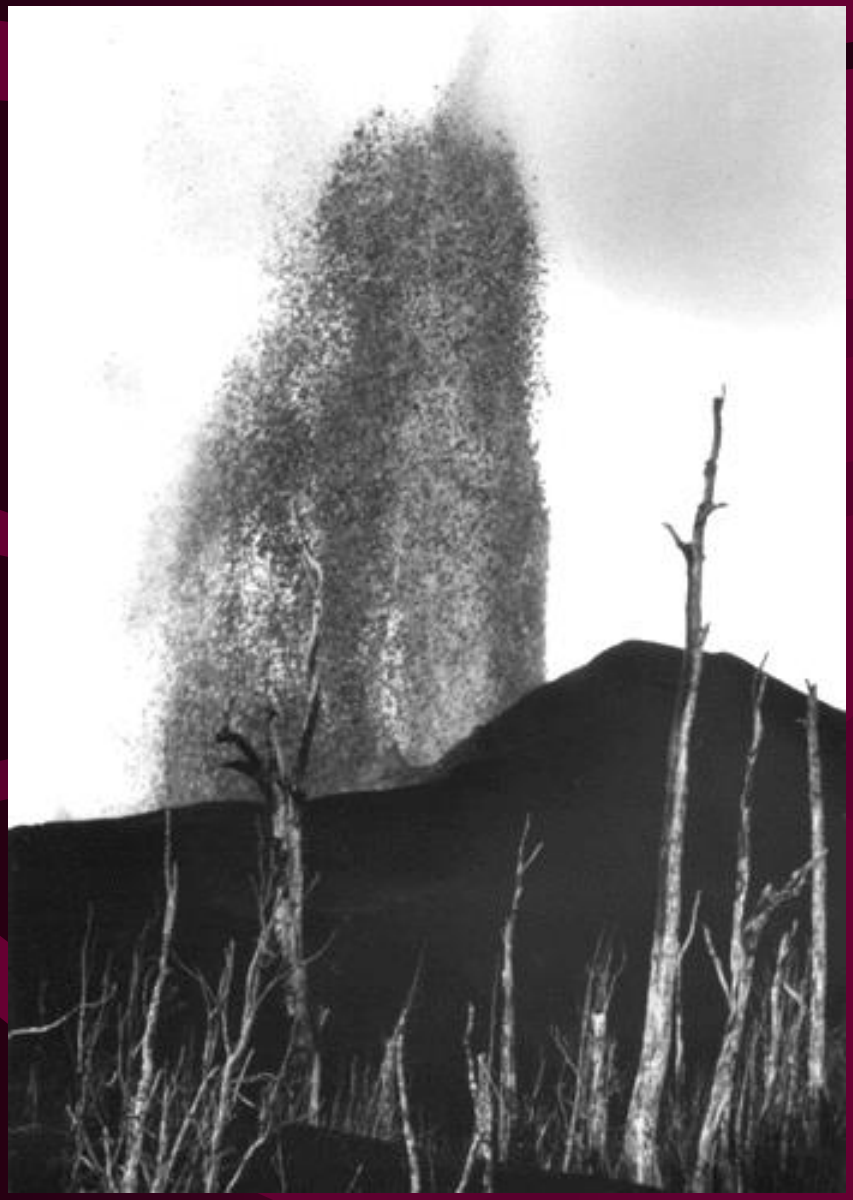
Talk to your table

Tell each other how a hotspot volcano is formed. If you need more details to help you understand, look on page 203 of the textbook.

Kilauea, March 1984

Mauna Loa, March 1984

A volcanic eruption on Hawaii



The lava fountain is about 25 meters in the air, but is relatively non-explosive compared to the eruption of a composite volcano. The Hawaiian islands were built up from the sea floor in this way.

Joe’s Hill is a shield volcano directly to the east of the Sunset Point rest stop on I-17 north of Phoenix.

This is an example of basalt. Basalt is the type of lava found erupting from shield volcanoes. Basalt is non-explosive, and erupts from the volcano and then flows down the volcano such as in the picture above. There are large deposits of basalt in Arizona near Flagstaff, and the Hawaiian Islands are composed of basalt.


Photo by Dr. Scott Rowland

This hot spring at Yellowstone gets its heat from the hot spot below the ground. The hot springs are so hot that they constantly steam, and will severely burn your skin if you put your hand in them.

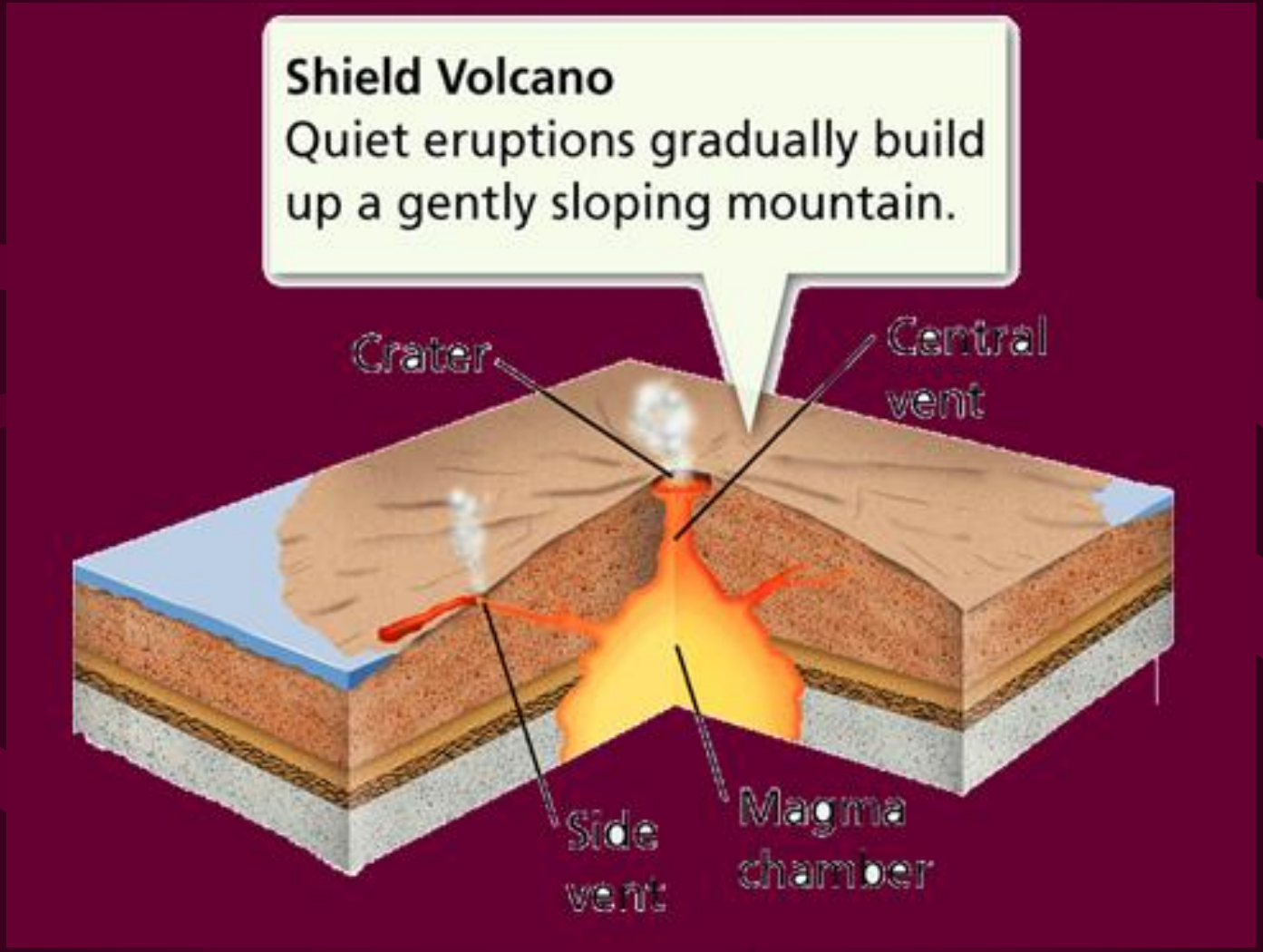
This is a photograph of Old Faithful, a geyser at Yellowstone National park. It is caused by heat from a hot spot below the surface.

Talk to your table

Some people think that there is a super-volcano underneath Old Faithful.

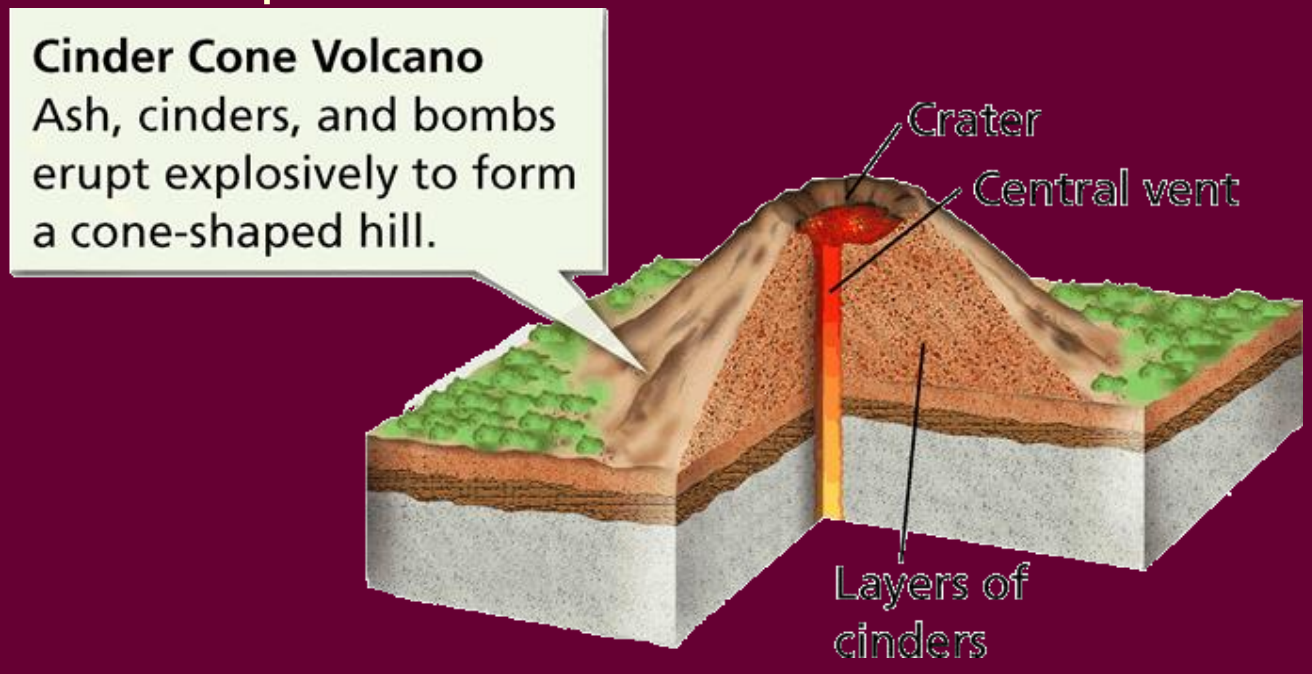
Do you think it is a super-volcano or just a hotspot that is heating up the water below?

Let's draw a SHIELD VOLCANO



CINDER CONE VOLCANO!

- Forms off of other volcanoes (their violent eruptions of lava create new volcanoes) .
- Ash, cinders, and bombs erupt explosively to form a cone-shaped hill.



Cinder Cone Volcanoes

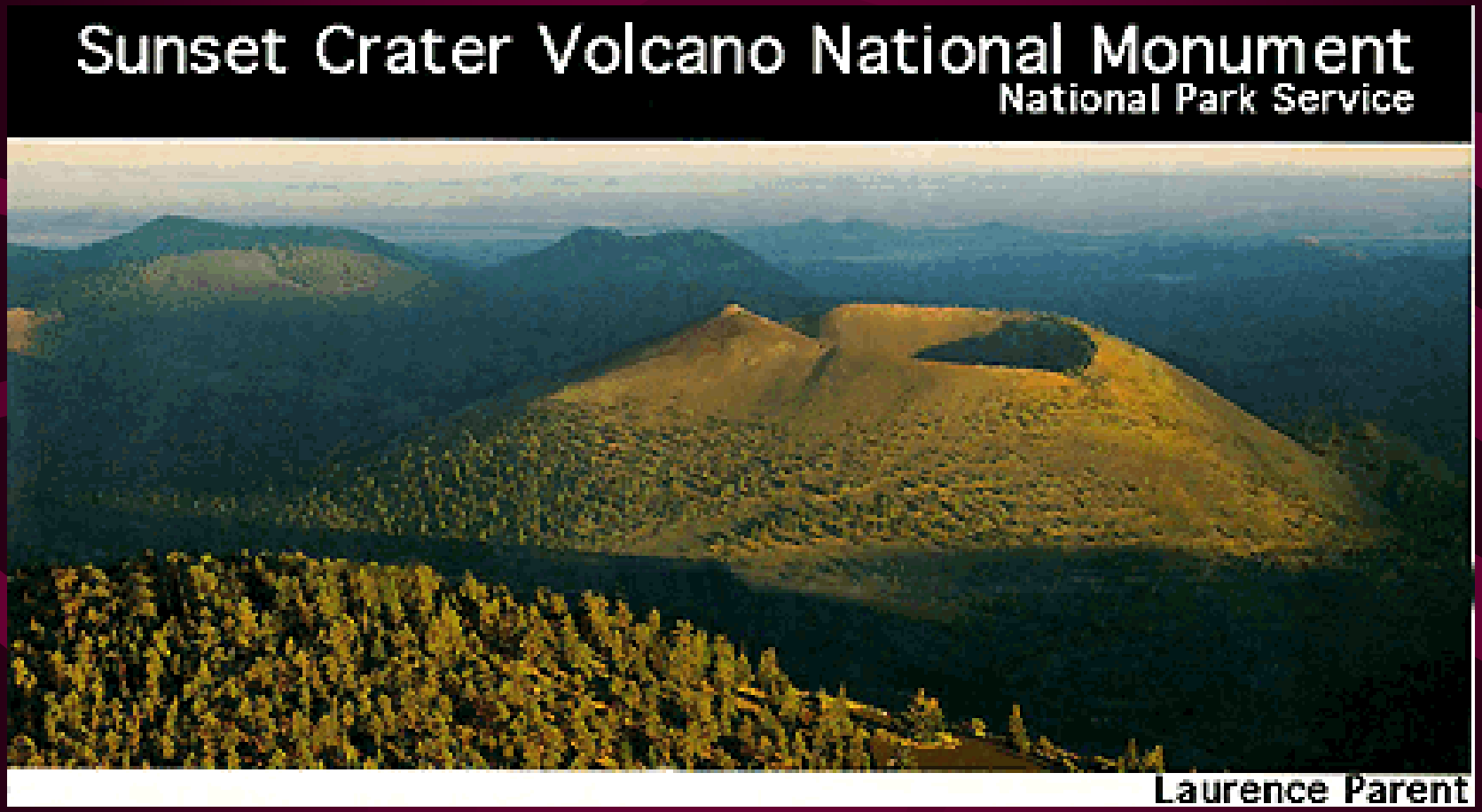
-Smallest type of volcano

-When in the air, the lava breaks apart into small pieces called cinders.

-The cinders accumulate into a cone around the volcano's central vent.

Cinder Cone Volcanoes

Sunset Crater in Flagstaff is a cinder cone volcano.

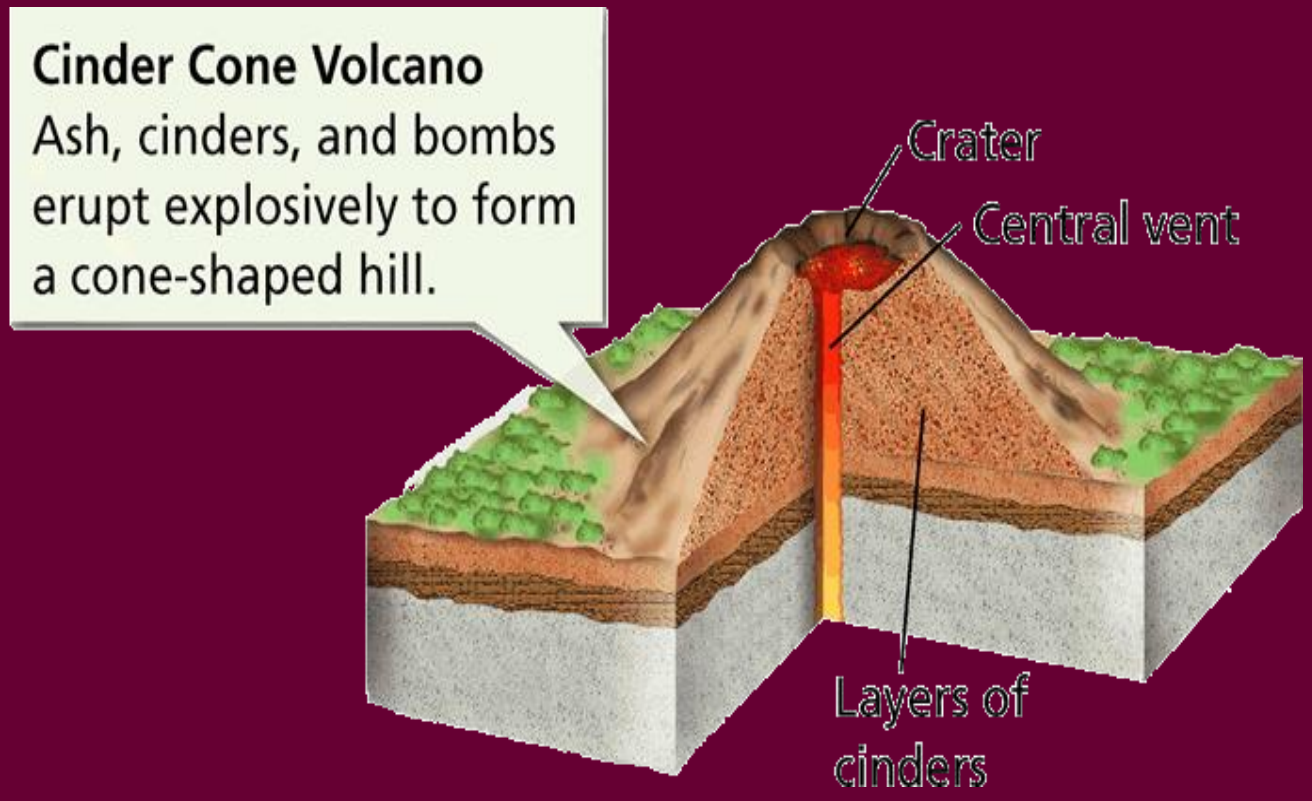


Sunset Crater

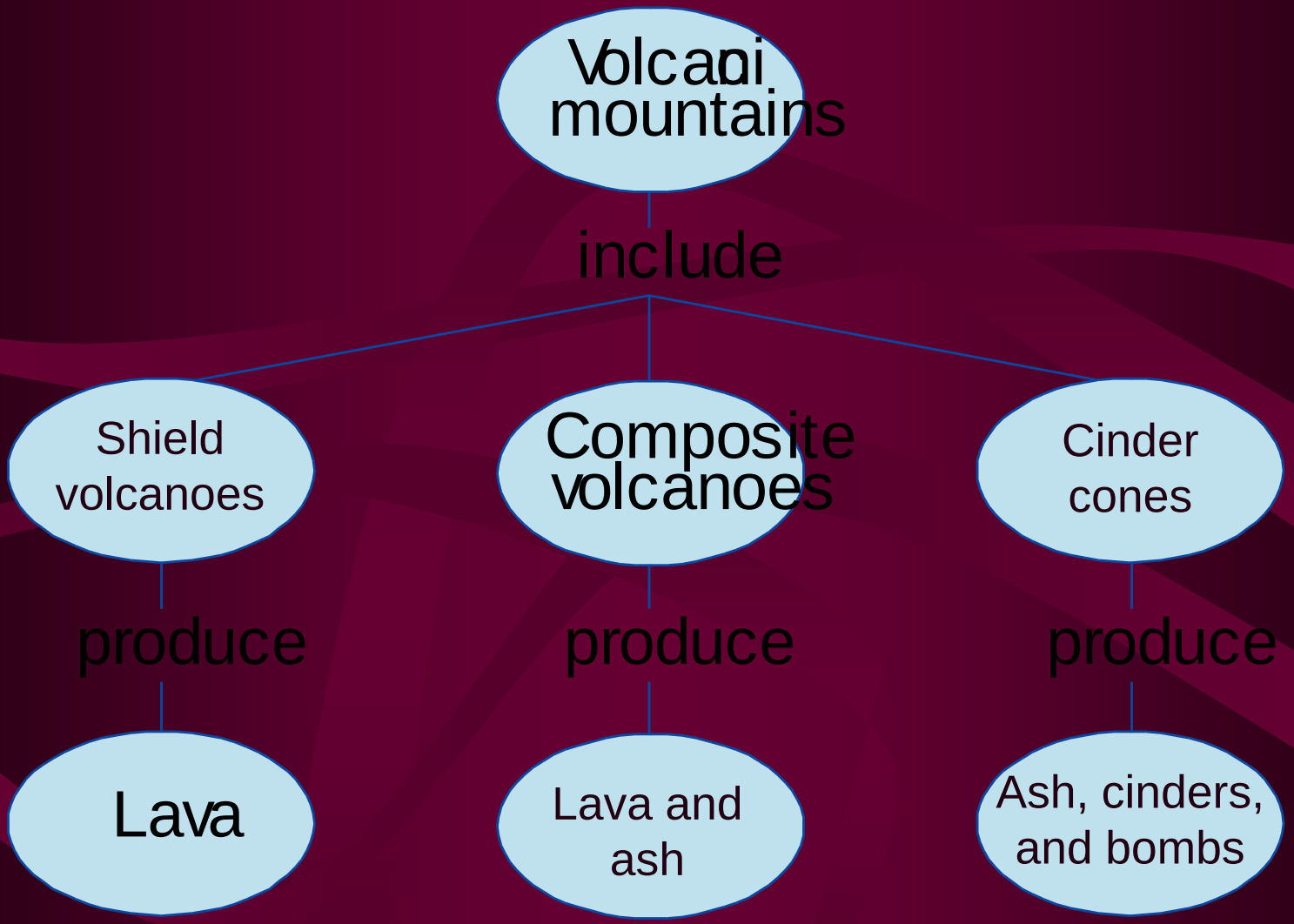
Paricutin - Mexico

- In 1943, a cinder cone volcano suddenly formed in a farmer's cornfield. After one week, the volcano was 5 stories high! By the end of the first year, 1,102 feet tall!

Let's draw a CINDER CONE VOLCANO



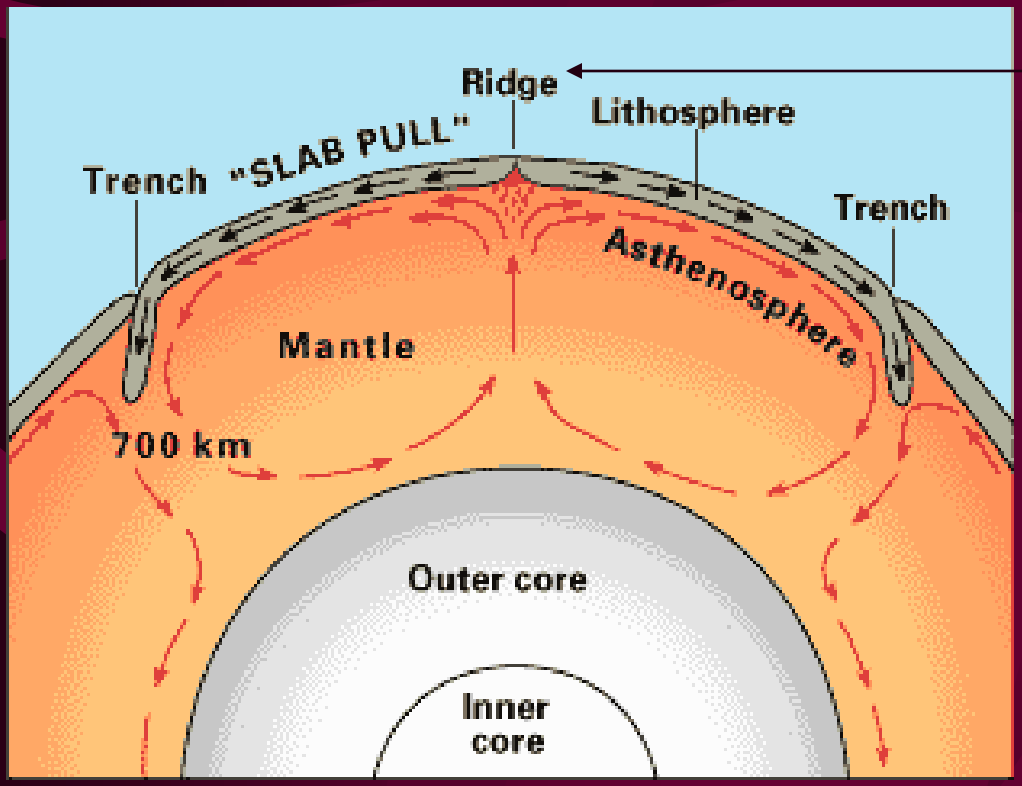
Graphic Organizer



Mid-Ocean Ridge!

- A Mid-Ocean Ridge is an area in the ocean floor where two crustal plates are spreading away from each other due to convection cells in the mantle.

- Lava erupts from mid-ocean ridge and if underwater the lava forms ‘pillow basalts’, named for their shape



The mid-ocean ridge is happening at the location labeled ‘Ridge’

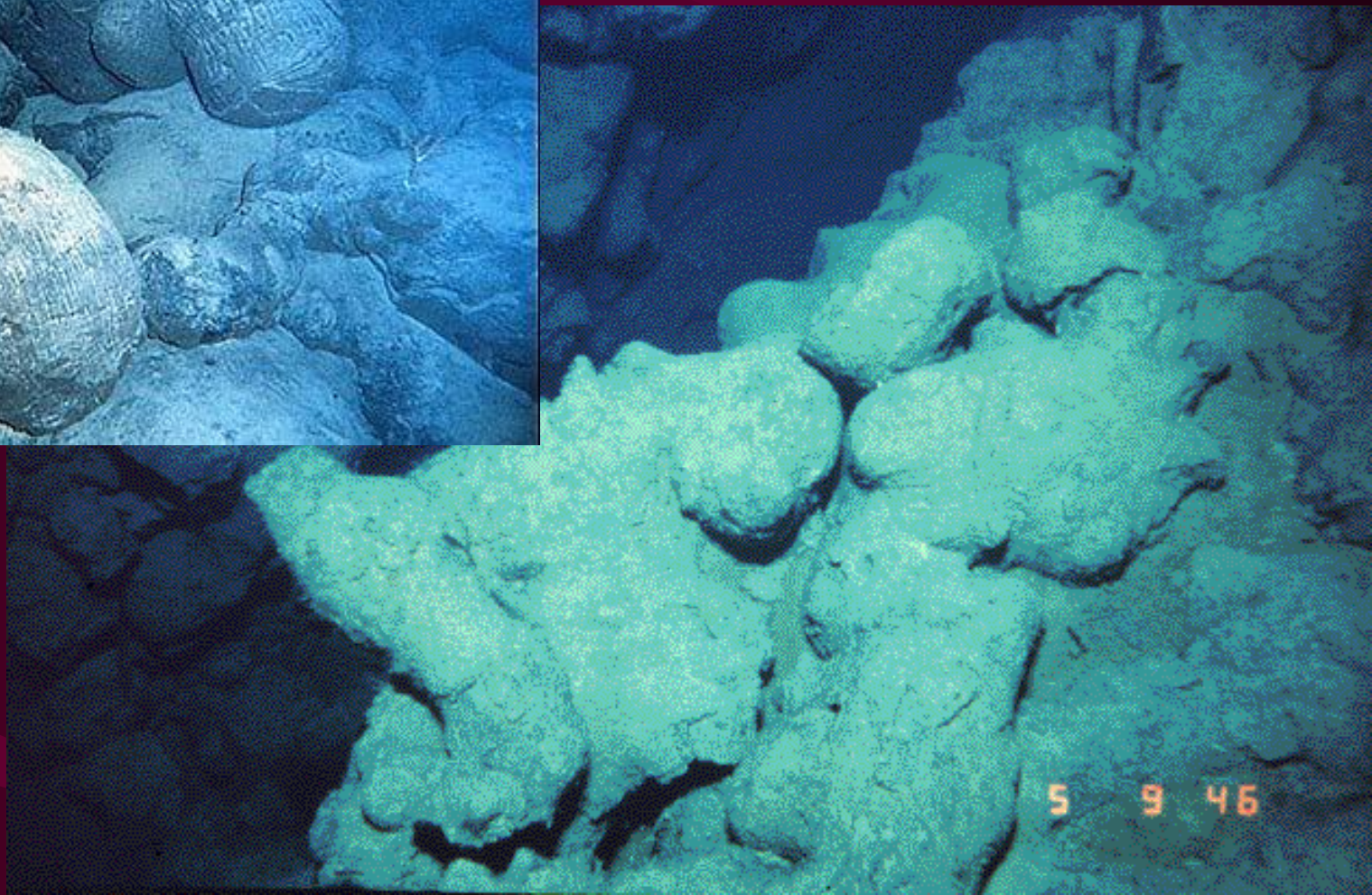
Locations of Mid-Ocean Ridges

An underwater volcanic eruption

A volcanic fissure eruption

This is a photo of lava engulfing buildings in Iceland. The Mid-Atlantic Ridge is exposed above the ocean in Iceland.

Pillow Basalt



Photos and diagrams courtesy of U.S. Geological Survey unless otherwise noted.