***Volcanoes and Plate Tectonics***

A. Origins of Magma

Magma- crust and upper mantle rock partially melt

Three conditions necessary for magma formation

 1. heat- crust heated by friction and mantle

2. pressure- decompression melting (lower pressure = lower melting point)

 3. water content- higher water = lower melting point

B. Origins of Volcanoes

Volcanoes- where magma reaches the surface,

about ***800*** active volcanoes on Earth today

 1. Divergent boundaries

Heat + Decompression – reduction in pressure allows the rock to melt

 a. mid ocean ridges

 b. rift valleys

 2. Convergent boundaries at subduction zones

Heat + water causes the rocks to melt

 a. oceanic-oceanic- volcanic island arcs

 b. continental-oceanic- continental volcanic arcs

 c. Ring of Fire- surrounding Pacific Ocean

 3. Intraplate- \*“hot spots” in middle of a plate, about 40 known

 a. mantle plumes rise and create magma

 examples: Kilauea Hawaii, Yellowstone Caldera

***Nature of Volcanic Eruptions***

A. Eruptions

Explosive or quiet depending on several factors

 1. Magma type: granitic, basaltic, rhyolitic

 2. Magma viscosity: more viscous = thicker = explosive

 3. Dissolved gases- mainly H2O and CO2

a. more gas = explosive (water vs carbonated)

b. faster release = explosive (open slowly vs open quickly)

B. Volcanic Material

 1. Lava flows – magma that has reached the surface

 basaltic

 \*- “pahoehoe” = hot, fast, smooth and gooey

 \*- "aa” = cooler, slow, sharp and jagged

 2. gases- water, carbon dioxide, sulfur (air pollution)

 \*3. pyroclastic materials- particles ejected

 a. ash

 b. lapilli/cinders

 c. bomb

 d. blocks

C. Warning Signs

 1. bulging of mountain

 2. increase in earthquakes

 3. smell of sulfurous gas

***Types of Volcanic Activity***

A. Anatomy 1. volcano- mountain 2. crater – depression

B. Types of Volcanoes

\*1. Shield volcano

 a. very broad, slight dome

 b. quiet eruptions

 c. mostly islands like Hawaii, Iceland

\*2. Cinder cone volcano

 a. small, steep

 b. small explosive eruptions, usually only one

 c. magma pipe- vent tube, solidifies and never erupts again

 d. Sunset Crater, AZ

\*3. Composite cone/stratovolcano

 a. large, symmetrical mountain

 b. large, violent eruptions

 c. Mt. St. Helens

C. Volcanic Hazards

 1. lava flow

 2. volcanic ash

 \*3. pyroclastic flow- hot material and gas

 \*4. lahar- volcanic mudflow

D. Extrusive volcanic landforms

1. caldera- depression caused by collapse. Example: Crater Lake, OR

2. Volcanic neck- magma pipe exposed by erosion

 3. Lava plateau- wide layers of hardened lava

G. Intrusive volcanic landforms- don’t break surface

 1. pluton- hardened magma beneath surface

 \*a. sill- magma between parallel rock layers

 \*b. laccolith- magma pushed rock layers upward

 \*c. dike- magma cuts across rock layers

 \*2. batholith- huge mass of magma that doesn’t erupt