***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