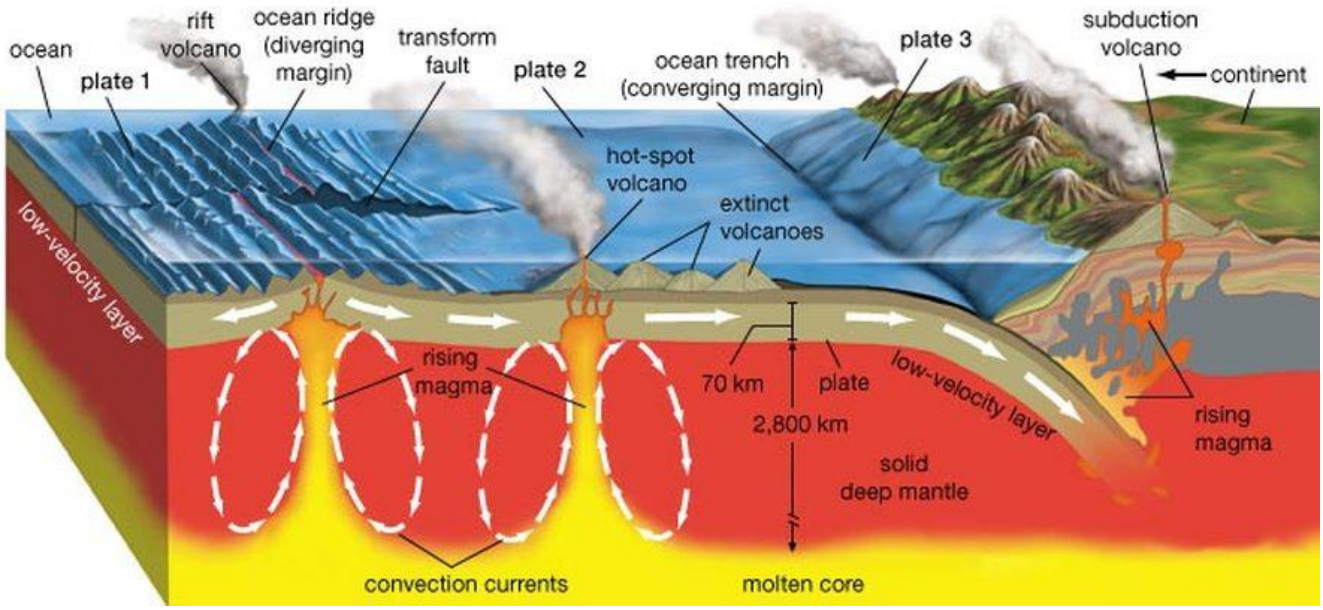
Chapter 7 Notes: Volcanoes

7.1 Volcanoes and Plate Tectonics

- **Volcanism** – movement of _____ (liquid rock produced within the earth) toward or onto the surface of the earth



- Magma that erupts onto the earth's surface is called _____.

- The opening through which the molten rock flows onto the surface is called a _____._____ – the structure formed by the vent and the volcanic material that builds up on the earth's surface

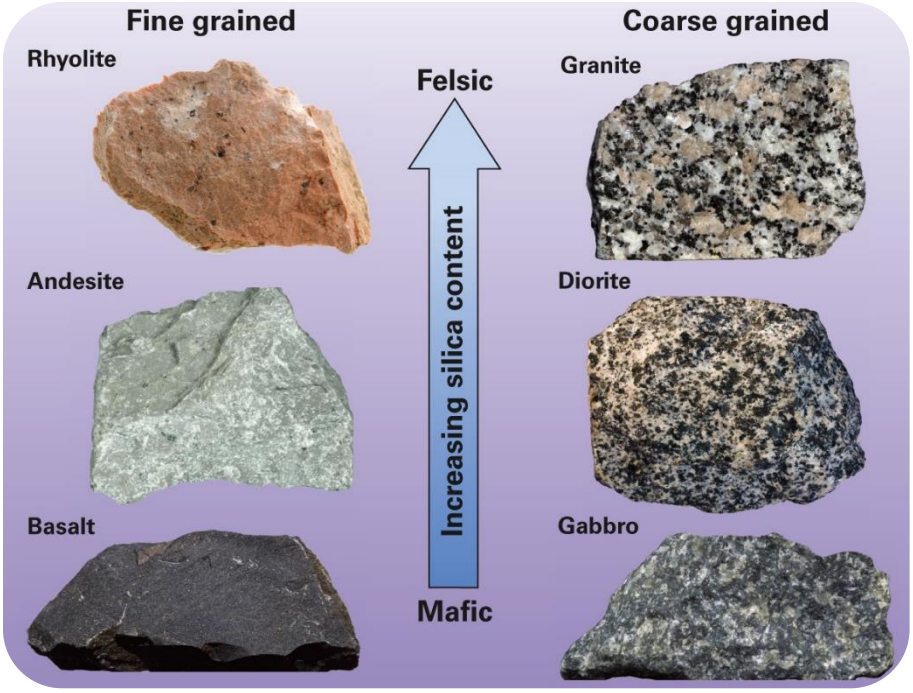
- Most magma pockets and active volcanoes form at plate boundaries (especially at _____ zones)

  - CONVERGENT BOUNDARY:
    - Water from the subducting plate enters the hot asthenosphere, causing mantle material to _____. Some of this magma erupts through the earth's surface, forming volcanic _____ near the edge of the continent.
    - <u>Example:</u> _____ Ring of Fire

- DIVERGENT BOUNDARY:
  - High volcanic activity at mid-ocean _____ due to the upwelling of magma from the asthenosphere
  - <u>Example:</u> Mid-Atlantic Ridge and _____
- HOT SPOTS:
  - Not all volcanoes develop along plate _____. Sometimes magma works its way to the earth's surface within other parts of the plate.
  - <u>Example:</u> _____ Islands

7.2 Volcanic Eruptions

- Two Main Types of Lava:
  1. **mafic lava –** _____ colored when hardened and rich in magnesium and iron
     - forms much of the oceanic crust
  2. **felsic lava –** _____ colored when hardened and rich in silica
     - common in continental crust



- Mafic Lava Categories:
  - **Pahoehoe** (puh-HOY-hoy) – wrinkled texture due to _____ flow
  - **Aa** (AH-ah) – jagged chunks due to quick or very _____ flows

- Other Lava Features:
  - Sometimes the outer part of a mafic lava flow cools so rapidly that it forms a hardened shell around a liquid interior. The still-molten lava flows out, leaving tunnels called _____ _____.
  - When lava flows out of fissures on the ocean floor, it cools rapidly, often separating into rounded blobs called _____ **lava**.

- Kinds of Eruptions
  - The _____ of the lava that reaches the surface largely determines the force with which a particular volcano will erupt.
  - Lava that contains large amounts of trapped dissolved _____ usually produces more explosive eruptions. Why?
    - Mafic lava is very hot and thin, and it flows almost as easily as _____. Because gases can easily escape from mafic lava, eruptions from oceanic volcanoes like those in _____ are usually quiet. The lava flows out from the volcanic opening like a red-hot _____.
    - In contrast, the felsic lavas of continental volcanoes like Mount Saint Helens tend to be _____ and thicker. They also contain large amounts of trapped gases, mostly water _____ and carbon dioxide. When a vent or fissure opens up, the dissolved gases within the lava boil out explosively, sending lava, steam, ash and other volcanic material _____ into the air.

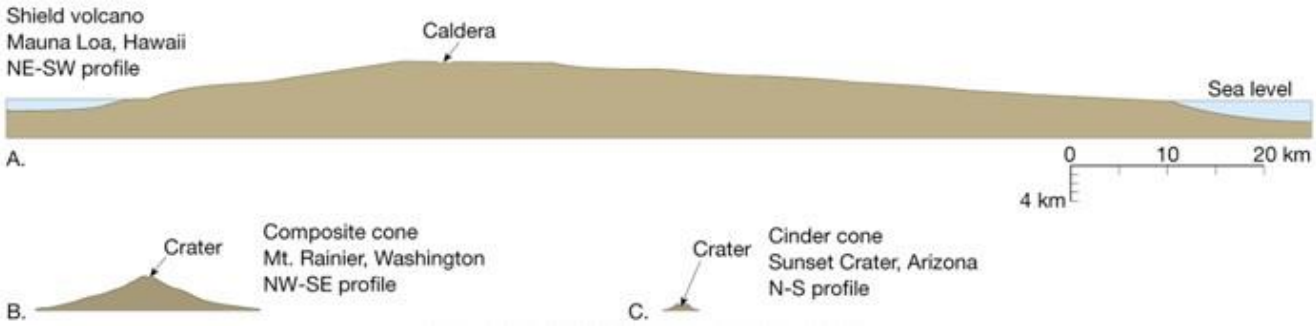
- Volcanic Rock Fragments
  - Unlike mafic lava, which tends to flow quietly, felsic lava explodes, throwing _____ **material** – rock fragments – into the air.
    - How Does Pyroclastic Material Form?
      - When cooling magma breaks into fragments because of the rapidly _____ gases within it
      - When a _____ of lava cools and solidifies as it flies through the air

- How Large is Pyroclastic Material?
    - .25mm or less = **volcanic dust**
    - 2mm or less = **volcanic ash**
    - 2-64mm = **lapilli** (luh-PIL-ie)
    - Large clots of lava that are thrown out of the volcano and cool in a round or spindle shape = **volcanic** _____
    - Largest pyroclastic material (some as big as houses) formed from solid rocks blasted from the fissure = **volcanic blocks**

- Three Main Types of Conic Volcanoes:
    1. **Shield volcanoes** – broad at base with gently sloping sides;_____ eruptions
        - Layers of hot mafic lava flow out around the vent, harden, and slowly build up to form the _____
        - <u>Example:</u> Mauna Kea, _____

    2. **Cinder cones –** made of solid fragments ejected from the volcano during very _____ eruptions
        - Very _____ slopes (close to 40°) and rarely more than a few hundred meters high
        - <u>Example:</u> Sunset _____, AZ

    3. **Composite volcanoes –**made from alternating quiet and explosive eruptions
        - Also known as _____
        - Develop into _____ volcanic mountains
        - <u>Example:</u> Mount _____, Japan
        - <u>Examples:</u> Mount Rainier, Mount _____, Mount _____, and Mount Saint Helens



- Other features:
  - **Crater** – the funnel-shaped _____ at the top of a volcanic vent
    - Formed when material is blown _____ of the volcano by explosions
    - Usually widens through weathering and _____
    - Example: San Miguel, El Salvador
  - When the magma chamber below a volcano is emptied, the volcanic cone may collapse, leaving a large, _____-shaped depression called a **caldera**
    - Eruptions that discharge large amounts of magma can also cause a caldera to form.
    - Example: Crater Lake, OR
    - Example: _____, Indonesia

- Predicting Volcanic Eruptions
  - If volcanic activity could be predicted far enough in advance, many lives might be saved.
  - _____ monitor for small earthquakes, a warning signal of an impending eruption.
    - These earthquakes result from the growing pressure on the surrounding rocks as magma works its way _____.
    - The number of earthquakes often _____ until they occur almost continuously just before an eruption.
  - Bulging of volcano surface
    - Before an eruption, the upward movement of magma beneath the surface may _____ out the surface of the volcano

7.3 Extraterrestrial Volcanism

- Many of the planets and moons in the _____ system are currently volcanically active (or once were).
- The Moon
  - Near side is covered with _____ lava flows
  - Craters are a result of meteorite bombardment. Large impacts early in the moon's history created deep basins that later flooded with lava (called _____)
- Mars
  - Has numerous volcanoes and volcanic features
  - Largest feature = _____ volcano Olympus Mons
    - But why so large? No _____ movement.
  - Seismically _____ → possible sign that Mars is still volcanically active
- Io
  - A _____ of Jupiter and the first planetary body (other than earth) on which active volcanoes have been sighted
  - In 1979 _____ *1 and 2* flew by the moons of Jupiter. Images taken showed _____ volcanoes erupting on Io.
  - Why so active?
    - The changes in Io's _____ cause the surface of the moon to fluctuate. The friction creates _____ and leads to Io's volcanism.