**Earth Science Notes**

**Overview**

Earth’s Structure

Geologic Time Scale

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Plate Boundaries

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**Earth’s Structure**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_ of Earth’s volume, \_\_\_\_\_ of Earth’s mass
	+ 2 regions
		- Solid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ core – iron, nickel, high density
		- Liquid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ core – iron, nickel, sulfur, oxygen
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_ of Earth’s volume; \_\_\_\_\_ of Earth’s mass
	+ Magnesium and iron-rich minerals
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ currents caused by heat from the core
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Region of partially melted rock at the surface of the mantle
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ differences cause small-scale convection currents
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_ of Earth’s volume, \_\_\_\_\_ of Earth’s mass
	+ Silicon, aluminum, calcium, sodium, potassium
	+ 2 types
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ crust – \_\_\_\_\_\_\_\_\_\_ dense, rich in aluminum and silicon
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ crust – \_\_\_\_\_\_\_\_\_\_ dense, more iron
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: The crust and uppermost portion of the mantle
	+ Broken into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that move with convection of the asthenosphere

**Geologic Time Scale**

* Based on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (origin of rocks), \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (layering of rocks), and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (evolution of life)
* Absolute ages have been assigned based on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* *****We are currently in the: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ eon, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ era, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ period, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ epoch*

**Plate Tectonics**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ large plates, several smaller ones
* Constant motion (a few cm per year) driven by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Interactions occur at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Plate Boundaries**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – two plates collide
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – crusts will compress into high mountain ranges (Himalayas)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – more dense oceanic crust will sink below continental crust
		- Creates a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Usually results in an ocean \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Mariana Trench)
		- Subducting plate melts and may rise to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Japan)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – two plates move away from each other
	+ - Magma rises through crack, creating new crust (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
		- Volcanoes can form (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – two plates slide past one another (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
	+ - Builds up strain in rocks; often resulting in earthquakes

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**Volcanoes**

* Occurs when magma reaches Earth’s surface through a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in the crust
* Commonly occur at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (about 80% at convergent boundaries where one plate subducts)
* Can release \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_ (CO2 or SO2)
* Classified according to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* 3 types
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – steep-sided, symmetrical cones, built of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, crater at summit (Ex. Mt. Fuji, Mt. Ranier)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – broad, gently sloping cones, built of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Ex. Mt. Kilauea)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – steep-sided cones, crater at summit, built of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Ex. Sunset Crater)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_– rounded, steep-sided dome, built of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, common on craters or flanks of composite volcanoes (Ex. Mt. St. Helens)





**Earthquakes**

* Occurs when\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Most often occur at breaks in rock masses, called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* 80% occur near \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Region where the rupture occurs is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Point on Earth’s surface directly above the focus is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Quakes under the ocean can trigger \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of energy move away from the focus and travel through the earth
* Total energy released is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Waves measured by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ indicates magnitude of quake
* Richter Scale is logarithmic – each increase in number means a \_\_\_\_\_-fold increase in wave intensity, which corresponds to a \_\_\_\_\_-fold increase in energy

**Rocks**

* 3 groups
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – formed when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Ex. basalt, granite)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – formed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Ex. limestone, shale, coal)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – formed when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Ex. marble, slate)

**Rock Cycle**

* Processes:
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (together called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (breaking down of rock)/ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (movement of fragments)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (heat and pressure)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Soil Formation**

* Components of soil: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



* Formation begins with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Weathering can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (ex. water seeping into cracks and freezing) or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (ex. dissolution of minerals by acid rain)
* Physical more common in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ climates; chemical more common in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ climates
* Once in formation environment, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are added and living organisms become incorporated
* Living components break down organic matter and release \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into the soil (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
* Nutrients are used and recycled by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and other organisms
* Formation influenced by
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: temperature affects rates of chemical reactions; precipitation affects soil pH and leaching
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: varies from region to region, can affect pH and texture
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: affects rate at which nutrients in soil are recycled and type and amount of organic matter in soil, soil erosion, and micro-organisms in soil
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Humans affect soils by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Topography of a region affects \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Formation is a continuous process
* Soil changes as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change
* Takes much longer to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

