**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_**

**Geology-Unit 7**

Earth’s Interior and Plate Tectonics

Earth’s Interior

* Earth’s layers are defined by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(what it is made of)
* Three main layers:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The crust
  + \_\_\_\_\_\_\_\_\_\_\_\_Layer;\_\_\_\_\_\_\_\_\_\_\_\_ layer;
  + 2 types of crust:
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(very \_\_\_\_\_\_\_\_\_\_, made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_\_thick)
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(less \_\_\_\_\_\_\_\_, made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_thick)
* The mantle
  + Starts \_\_\_\_\_\_\_\_\_\_\_\_km below oceanic crust; \_\_\_\_\_\_\_\_\_\_\_layer
  + \_\_\_\_\_\_\_\_\_ layer; \_\_\_\_\_\_\_\_\_\_\_\_\_\_thick; over \_\_\_\_\_\_\_\_\_ of Earth’s volume
  + Dominate rock type in uppermost mantle is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The core
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_below surface, Made mostly of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_ of earth’s mass; Very \_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_thick
* Physical Structure of the Earth
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: found in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; about \_\_\_\_\_\_\_\_\_\_\_ thick; cool, rigid; \_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: found beneath the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; to a depth of about \_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_, weak layer that is easily \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: middle layer found in \_\_\_\_\_\_\_\_\_\_\_ mantle; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_km; more rigid layer; rocks are very hot and capable of gradual flow (runs like hot asphalt)
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: found below \_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_ layer; \_\_\_\_\_\_\_\_\_\_\_ thick; convective flow of metallic iron within generates Earth’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ field
  + \_\_\_\_\_\_\_\_\_\_\_\_\_: found at the core of earth; \_\_\_\_\_\_\_\_\_\_; very \_\_\_\_\_\_\_\_\_\_, radius of core is \_\_\_\_\_\_\_\_\_\_\_\_
* Discovering Earth’s Layers
  + \_\_\_\_\_\_\_\_\_\_\_\_\_: the boundary separating the \_\_\_\_\_\_\_\_\_\_\_ from the \_\_\_\_\_\_\_\_\_\_, discernable by an \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in velocity of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Velocity of seismic waves \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ abruptly below crust

Continental Drift

* In 1915, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ proposed the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hypothesis
  + Stated continents had once been joined to form a supercontinent, \_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Pangaea means\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Proposed it began to break apart about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Evidence for continental drift
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Continental Puzzle
  + Continents \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ like a jigsaw puzzle
* Matching fossils
  + Includes several \_\_\_\_\_\_\_\_\_\_\_ organisms found on different landmasses
    - Ex. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ found in South American and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Rock Types and Structures
  + Several \_\_\_\_\_\_\_\_\_\_\_\_\_\_ belts end at one coastline and reappear on a landmass across the ocean
    - Ex. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ found in US and on British Isle and Scandinavia
* Ancient Climate
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ covered large areas of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hemisphere \_\_\_\_\_\_\_\_\_\_\_ million years ago. Glacial till has been found in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Wegener could not explain why continents moved

Plate Tectonics

Plate Tectonic Theory

* Remember the lithosphere (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_layer)
* A \_\_\_\_\_\_\_\_\_\_ is one of the numerous rigid sections of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that moves as a unit over the material of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Major Difference from Wegener: continents moved \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Largest plate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plate
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the plates are defined by the \_\_\_\_\_\_\_\_\_\_\_\_\_ of a continent
* Plates move very \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, about \_\_\_\_\_\_\_\_\_\_\_\_\_ per year, about the rate of fingernails growing
* Movement is driven by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ distribution of \_\_\_\_\_\_\_\_\_ within the Earth

Types of Plate Boundaries

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Boundary (also called spreading centers)
  + Two plates move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plate margins, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lithosphere made
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Boundary
  + Two plates move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plate margins, lithosphere \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Boundary
  + Margins where two plates \_\_\_\_\_\_\_\_\_\_\_ past each other without the production or destruction of the lithosphere

Actions at Plate Boundaries

Divergent Plate Boundaries

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Oceanic Ridges
  + Continuous elevated zones on the floor of all major ocean basins. The \_\_\_\_\_\_\_ at the crest of ridges represent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plate boundaries
* Rift valleys
  + \_\_\_\_\_\_\_\_\_\_ faulted structures found along the \_\_\_\_\_\_ of divergent plate boundaries; can develop on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_
* Seafloor spreading
  + Produces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lithosphere; \_\_\_\_\_\_\_\_\_\_ cm/year
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Rifts
  + When spreading centers develop within a continent, the landmass may \_\_\_\_\_\_\_\_\_ into \_\_\_\_\_\_\_\_ or more smaller segments, forming a rift
    - Ex. East African rift valley; Rhine Valley in NW Europe

Convergent Boundaries

* As two plates converge, the \_\_\_\_\_\_\_\_\_\_ edge of one is bent \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ allowing it to slide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the other
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: occurs when one \_\_\_\_\_\_\_\_\_\_\_ plate is forced down into the \_\_\_\_\_\_\_\_\_\_\_\_ beneath a second plate
* Convergent boundaries can form between:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Oceanic-Continental Collisions
  + \_\_\_\_\_\_\_\_\_\_\_\_ oceanic slab \_\_\_\_\_\_\_\_\_\_\_\_ into the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Pockets of magma develop and rise
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form in part by volcanic activity caused by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ lithosphere \_\_\_\_\_\_\_\_\_\_\_\_ a continent
  + Ex. Andes, Cascades, Sierra Nevada Mountains
* Oceanic-Oceanic Collisions
  + Two oceanic slabs \_\_\_\_\_\_\_\_\_\_\_\_\_ and one descends \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the other
  + Often forms \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on ocean floor
  + Volcanic island arcs form as volcanoes emerge from the sea
    - Ex. Aleutian, Mariana, and Tonga Islands
* Continental-Continental Collisions
  + When \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plates contain continental material, two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ collide
  + Can produce new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; Ex. Himalayas

Transform Fault Boundary

* At a transform fault boundary, plates grind past each other \_\_\_\_\_\_\_\_\_\_\_\_\_ destroying lithosphere
* Transform faults:
  + Most \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ segments of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + At the time of formation, they roughly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the direction of plate movement
  + They aid in the movement of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ material
  + Can lead to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Ex. San Andreas Fault of California

Testing Plate Tectonics

Evidence for Plate Tectonics

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + The natural remnant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_ bodies
  + This permanent magnetization acquired by rock can be used to determine the location of the magnetic \_\_\_\_\_\_\_\_\_\_\_\_ at the time the rock became magnetized
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: when rocks show the \_\_\_\_\_\_\_\_\_\_\_ magnetism at the present magnetism field
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: when rocks show the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ magnetism at the present magnetism field
* One of the strongest pieces of evidence for seafloor spreading:
  + Discovery of strips of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; which lie as \_\_\_\_\_\_\_\_\_\_\_ image across the oceanic ridges
* Earthquake Patterns
  + Close link between \_\_\_\_\_\_\_\_\_\_\_\_\_ earthquakes and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Absence of deep-focus earthquakes along the oceanic ridge system was shown to be consistent with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Ocean Drilling:
  + Data on the edges of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ confirmed what the seafloor spreading hypothesis predicted
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ oceanic crust is at the ridge \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_ is at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Hot spots
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a concentration of \_\_\_\_\_\_\_\_\_\_\_\_within the \_\_\_\_\_\_\_\_\_\_\_\_\_ capable of producing \_\_­­­­­\_\_\_\_\_\_\_\_\_\_\_\_, which rises to Earth’s surface
  + The pacific plate moves over a hot spot, producing the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ islands
  + Hot spot evidence supports that plates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the Earth’s surface

Mechanisms of Plate Motion

Causes of Plate Motion

* Scientists generally agree that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurring in the mantle is the basic driving force for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* During convection, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ material \_\_\_\_\_\_\_\_\_ and cooler, more dense material \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: the motion of matter resulting from changes in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The heat is generated by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of elements like Uranium found in the Earth’s crust and mantle

Slab-Pull and Ridge-Push

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a mechanism that contributes to plate motion in which \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ oceanic crust sinks into the \_\_\_\_\_\_\_\_\_\_\_\_\_ and pulls the trailing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ along. It is thought to be the primary downward arm of convective flow in the mantle
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to slide down the sides of the oceanic ridge under the pull of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. May contribute to plate motion

Mantle Convection

* Mantle \_\_\_\_\_\_\_\_\_\_ are masses of \_\_\_\_\_\_\_\_\_\_\_-than-normal mantle material ascend toward the \_\_\_\_\_\_\_\_\_\_\_\_, where they may lead to \_\_\_\_\_\_\_\_\_\_\_ activity
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ distribution of heat within the Earth causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ convection in the mantle that ultimately drives plate motion