

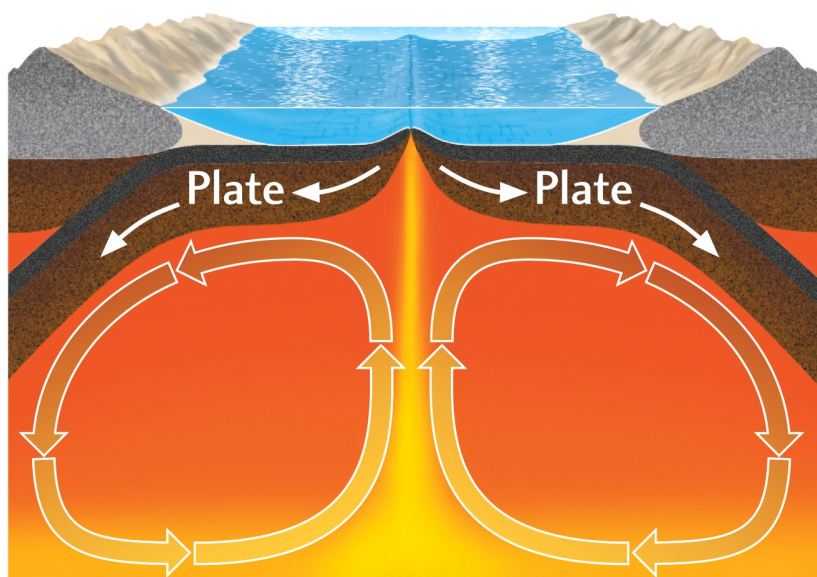
New Evidence of a Dynamic Earth

Discovery during WWII

Sonar readings used to measure the _____ of objects underwater, revealed that the Atlantic Ocean floor was not flat; it has trenches, mountain ridges and volcanoes. After the war, oceanographers discovered a massive ocean mountain range, called the _____. Trenches were also found at the edges of some continents.

Mantle Convection

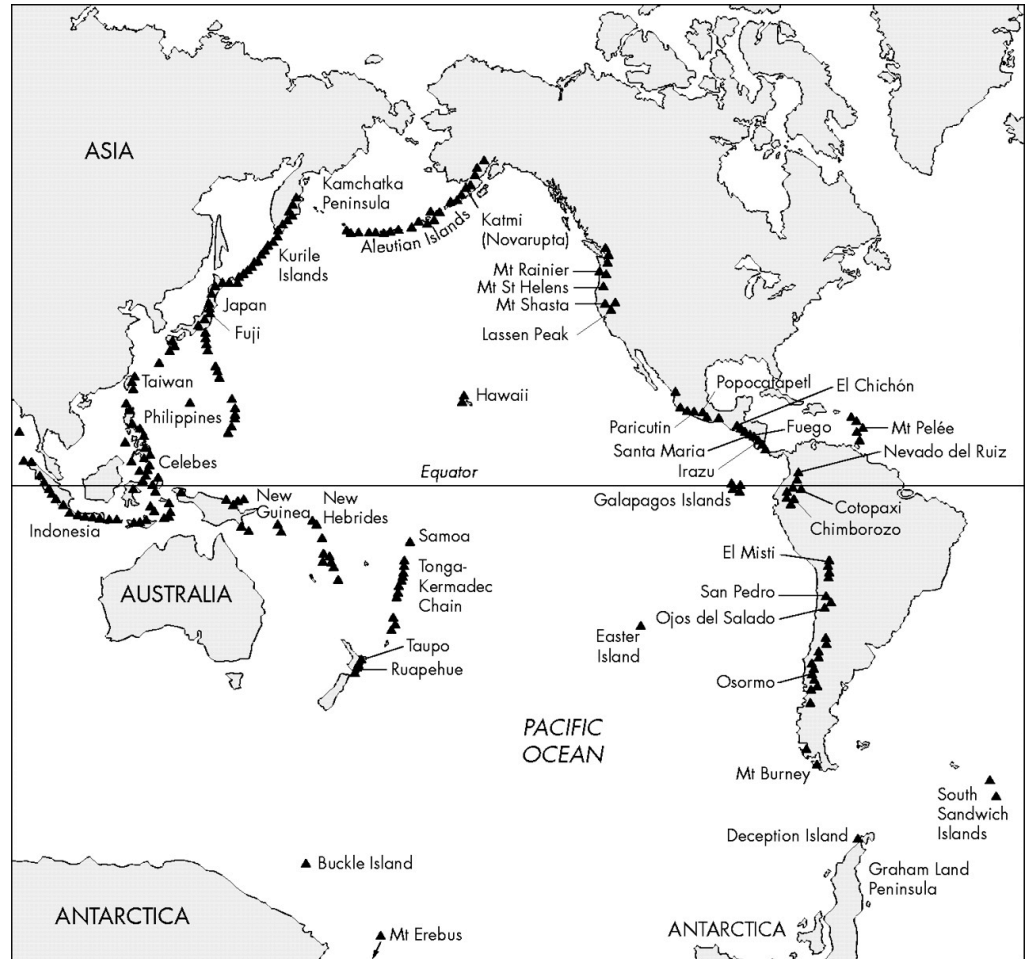
- Giant _____ cells within the upper mantle drag the plates along laterally
- Where convection rises, _____ takes place
- Where convection cells descend, they drag crust down, causing _____
- Heat comes from two sources: some _____ from the initial creation of the planet, and the rest is from the breakdown of naturally occurring _____ substances



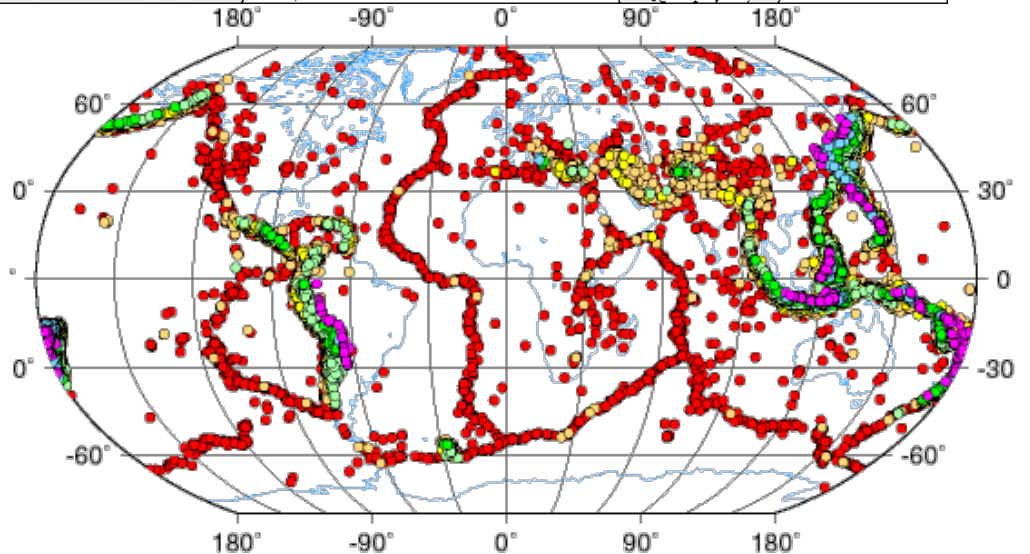
Evidence for Plate Tectonics

Volcanic Eruption and Earthquake Patterns – the distribution of volcanoes and earthquakes line up with the network of _____ and _____

Volcano
Patterns

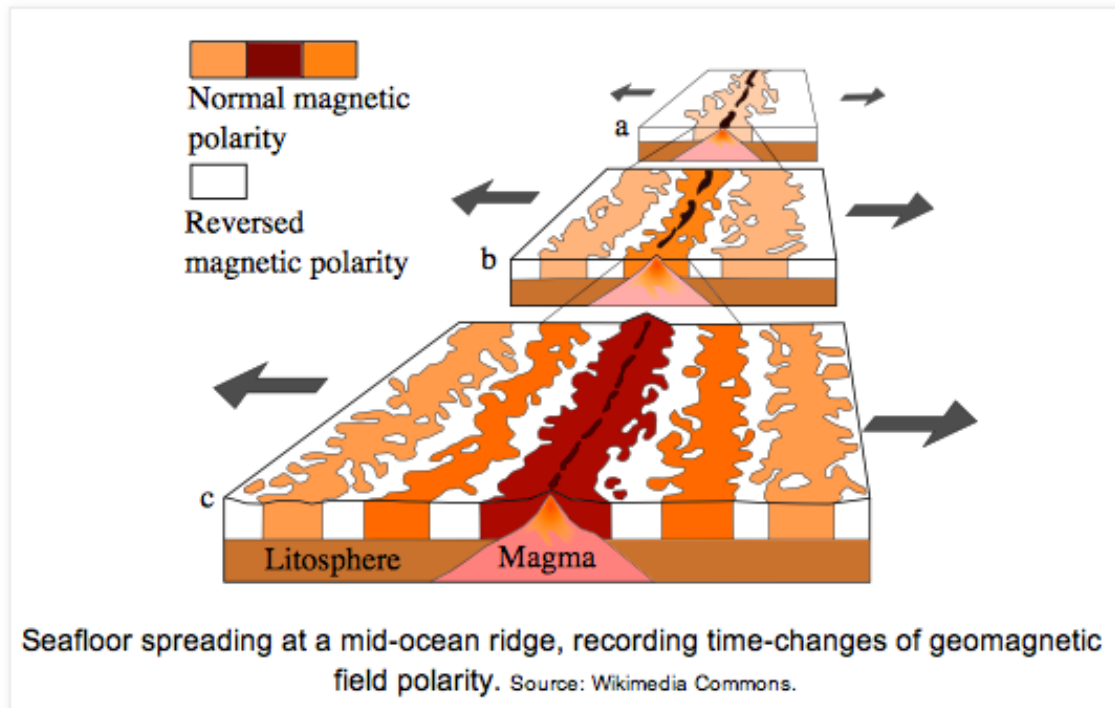


Earthquake
Patterns



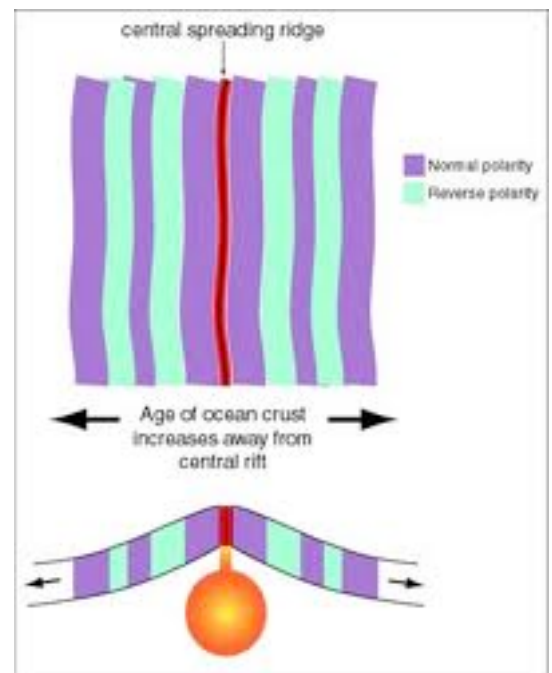
Magnetic Reversals

The magnetic stripes are products of steady creation of _____ ocean crust over geologic time – as the Earth's north and south poles _____ every _____ years



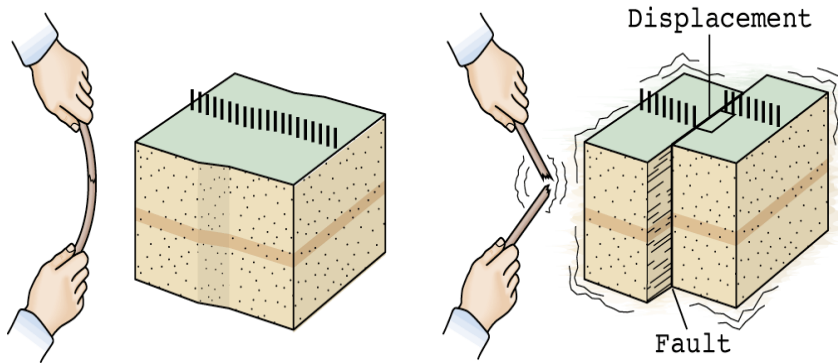
Radioactive Dating

Rock near mid-ocean ridges is _____ than rock near _____



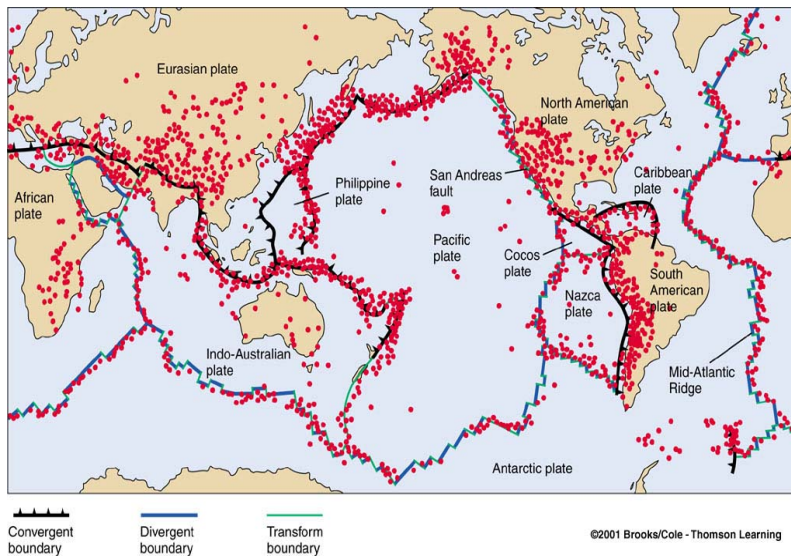
Earthquakes – What is happening?

As tectonic plates move, they _____, bend, lift and crack; energy is _____. Tectonic forces overcome the _____ and the plates spring apart. This sudden release of energy causes _____ or trembling. Earthquakes are usually associated with _____ where the lithosphere has been displaced. As the plates continue to adjust their position, _____ result.

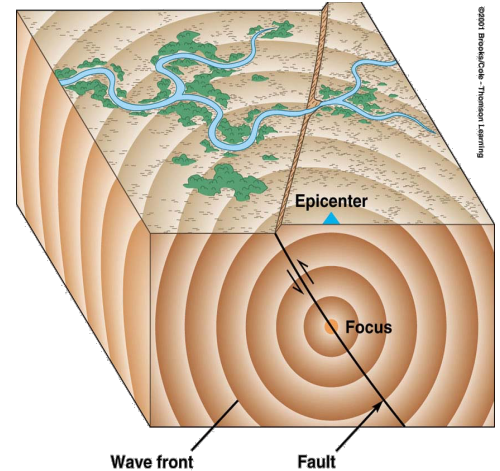
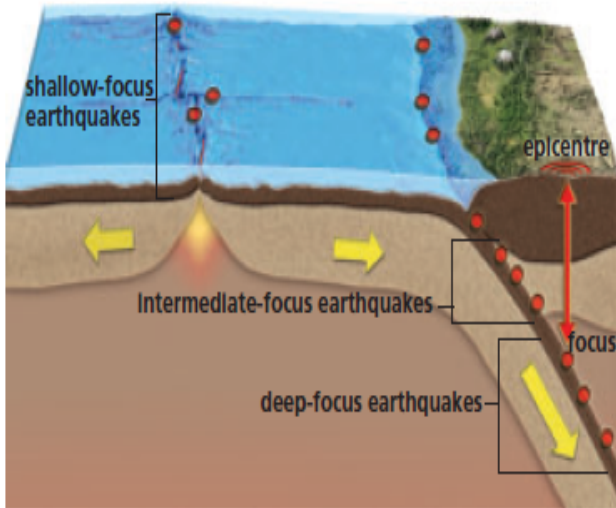


Earthquakes – Locations

Eighty percent of all earthquakes occur in the _____. Most of these result from _____ boundary activity. The remaining occur in the _____ of plates and on diverging boundaries. More the 150,000 quakes are strong enough to be felt and recorded each year.



The point within the Earth where faulting begins is called the _____. The point directly above the focus, on the surface is called the _____.



Shallow focus earthquakes occur in the _____.
 Intermediate earthquakes occur in _____ zones.
 Deep focus earthquakes occur in the _____.

Seismic Waves

Earthquakes transmit mechanical _____ in the form of seismic waves. There are two types of seismic waves.

Body waves travel through a medium. Earthquakes cause two types of body waves.

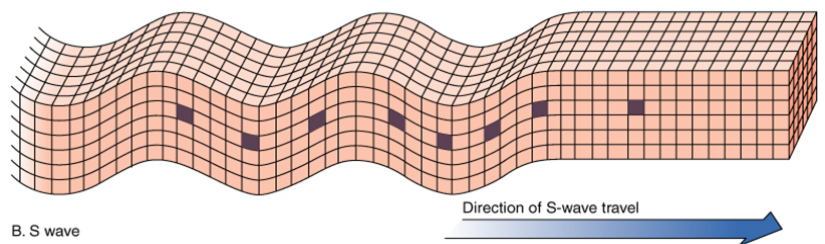
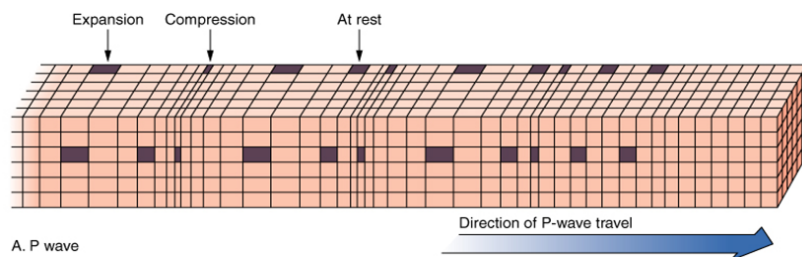
- Primary waves (P-waves), also known as _____

_____ waves, can travel through solids, liquids and gases; they pass through _____ the layers of the Earth

- o Material moves in the _____ direction as wave movement

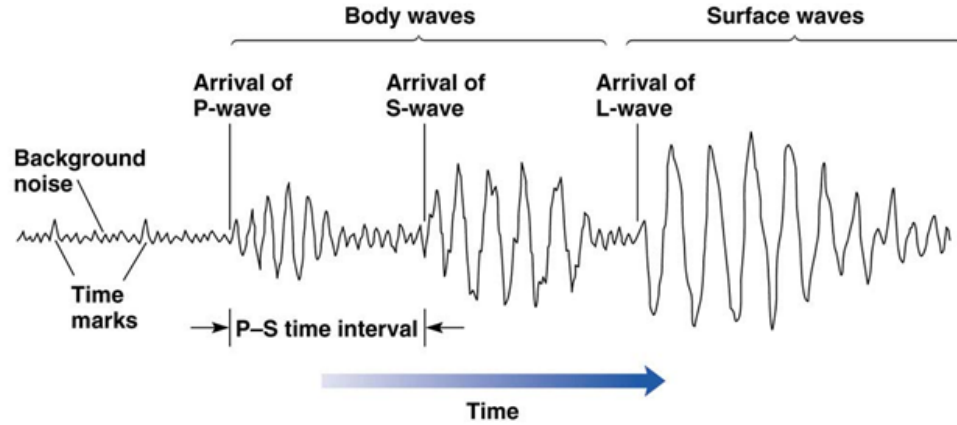
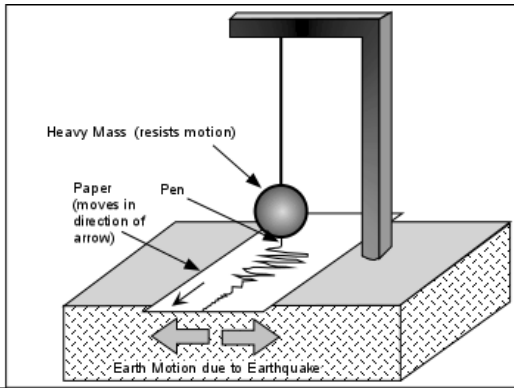
- Secondary waves (S-waves), also known as _____ waves, travel more _____ and only pass through _____ rock

- o Material moves _____ to the direction of wave movement



Surface waves travel _____ but not through the Earth and cause the most destruction.

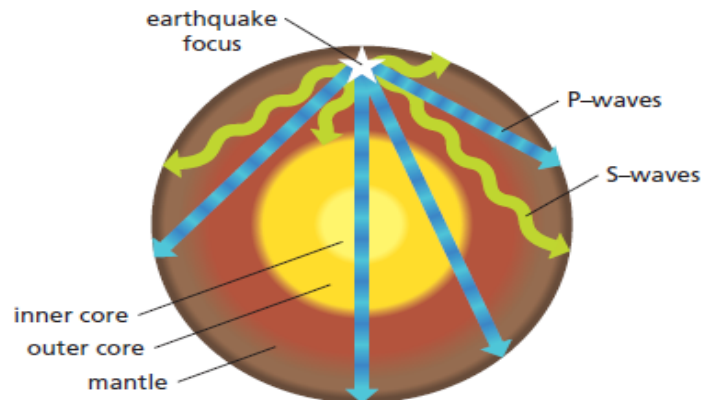
Seismographs record earthquake events



- P waves arrive _____, then S waves, then _____ waves
- Average speeds of all these waves is known
- After an earthquake, the difference in arrival times at a seismograph station can be used to calculate the distance from the seismograph to the _____.

Seismic waves and layers of the earth:

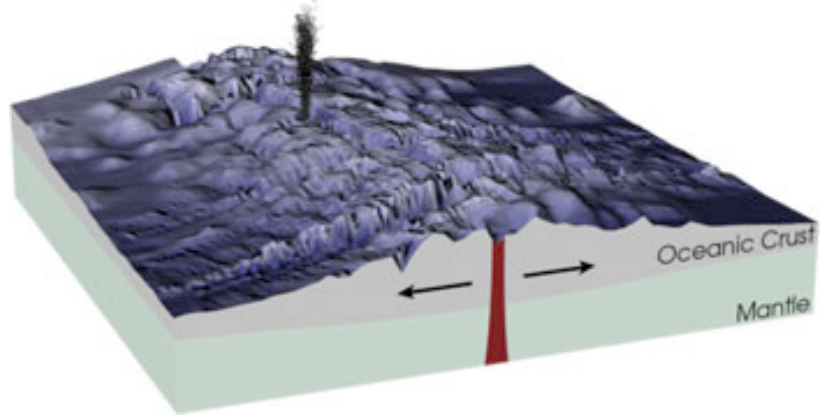
By measuring the _____ and _____ of seismic waves scientists have learned about the _____ structure of the Earth



A volcano marks a spot in the lithosphere where magma and gases reach the Earth's surface. Once it reaches the surface, magma is referred to as _____.

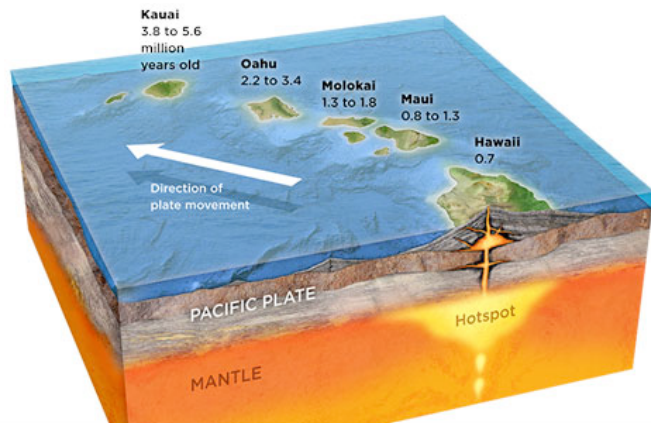
Volcanoes at Mid-Ocean Ridges

In areas of _____ oceanic-oceanic boundaries, the crust tears, relieving pressure from the mantle below, and magma extrudes to the surface



Hot Spots and Volcanic Island Chains

Hot spots are regions of very hot mantle, heated by a concentration of _____ substances near Earth's core. This creates columns of rising mantle, which bursts through a weakened lithosphere, forming a volcano. The hot spot remains _____ as the lithosphere moves over it. As the plate moves away from the hot spot, the volcano becomes _____. Eventually the hot spot forms a new volcano, thus creating a chain of volcanoes stretching away from the hot spot in the direction of the plate motion. Hot spots can be found beneath the ocean or on a continent.



Volcanic Belts and Island Arcs

At a subduction zone, the _____ plate pulls trapped water down into the mantle with it. The resulting steam softens magma and moves its way upward, creating a row of volcanoes roughly parallel to the boundary. A volcanic _____ or _____ of **inland** volcanoes is created on an overriding _____, parallel to a _____ boundary. A volcanic _____, or line of volcanic **islands** is created on an overriding oceanic plate parallel to an oceanic-oceanic boundary.

