The Theory of Plate Tectonics

J. Tuzo Wilson: A Canadian scientist: observed that there are cracks in the continents similar to those on the ocean floor.

According to Wilson:

* the lithosphere is broken into separate sections called plates.
* Plates: a section of the lithosphere that slowly moves over the asthenosphere carrying pieces of continental and oceanic crust.
* the plates fit closely together along cracks in the lithosphere.

A Theory of Plate Motion

Wilson combined the theory sea-floor spreading, the theory continental drift, and Earth's plates into a single theory - The Theory of Plate Tectonics.

Scientific Theory: well tested concept that explains a wide range of observations.

Continental Drift - a hypothesis that all the continents had once been joined together in a single land mass and have since drifted apart.
Alfred Wegener formed this hypothesis.

Sea-Floor Spreading: the process that continually adds new material to the ocean floor. Harry Hess was scientist credited with this theory.

Plate Tectonics: a geological theory that states that pieces of Earth's lithosphere are in constant, slow motion, driven by convection currents in the mantle.

The theory of plate tectonics explains the formation, movement, and subduction of Earth's plates.

How Earth's Plates Move

The plates of the lithosphere float on top of the asthenosphere

Convection Currents rise in the asthenosphere and spread out beneath the lithosphere

No plates can budge without affecting the other plates surrounding it.

As the plates of Earth move they can:

1. collide
2. pull apart
3. grind past one another

When this happens spectacular things happen to the surface of Earth like:

- volcanos
- mountains
- deep-sea trenches

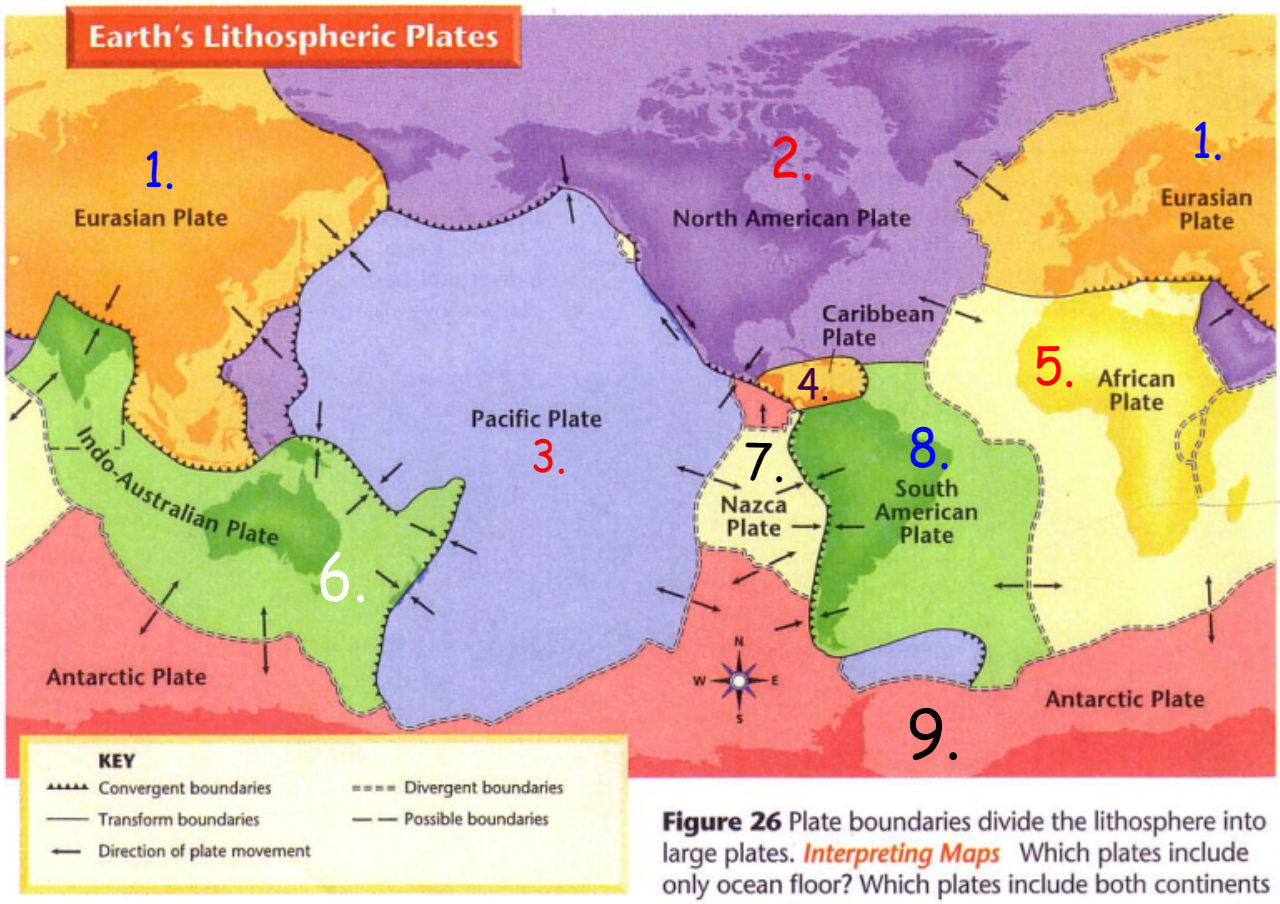


Figure 26 Plate boundaries divide the lithosphere into large plates. *Interpreting Maps* Which plates include only ocean floor? Which plates include both continents and ocean floor?

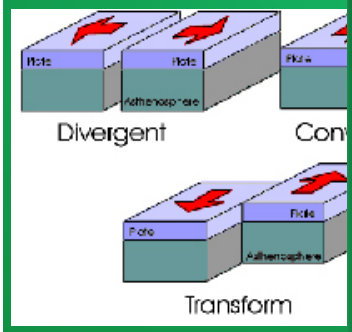
Plate Boundaries

Plate Boundaries: edges of different pieces of the lithosphere meet.

Fault: break in the Earth's crust where rocks have slipped past each other.

For each type of boundary, there is a different type of plate movement.

Types of plate boundaries

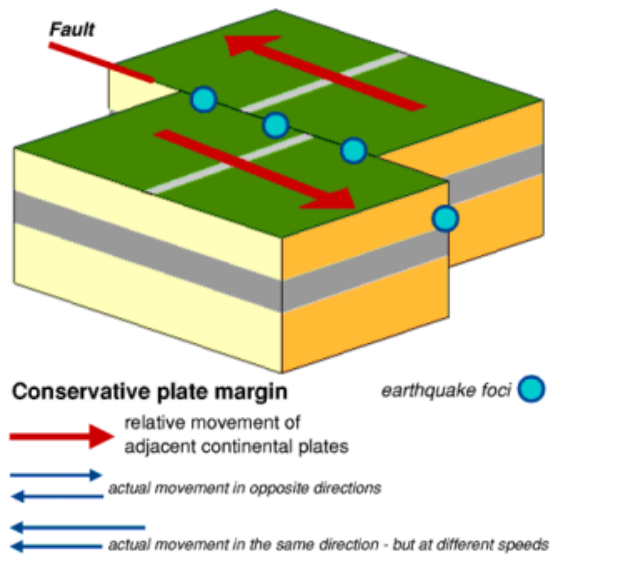


move to reveal

Convergent
Divergent
Transform

http://www.n-d-a.org/earthquake.php

Transform Boundaries



Transform Boundary: place where two plates slip past each other moving in opposit directions.

Crust is neither created or destroyed.

Example: Earthquake

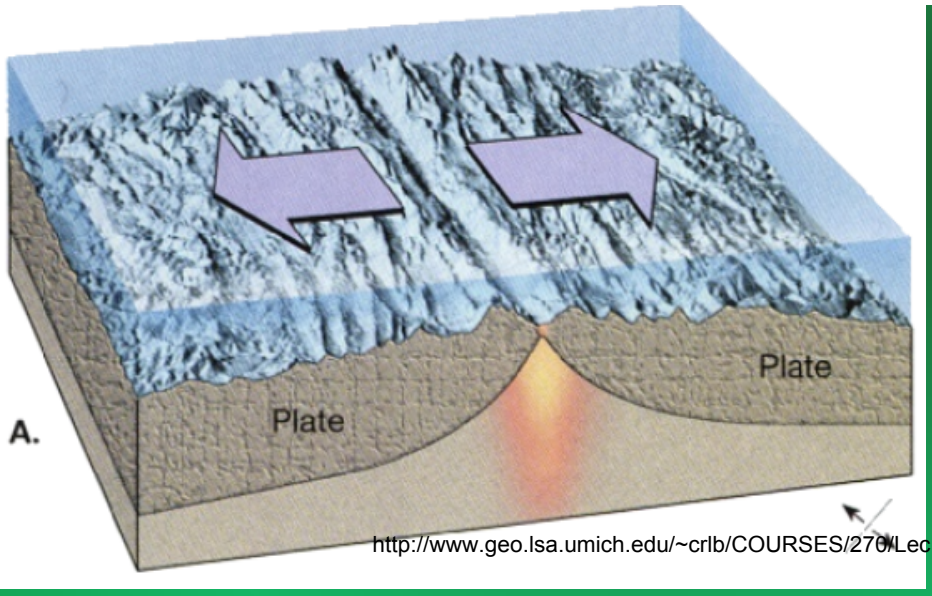
http://www.stvincent.ac.uk/Resources/EarthSci/Tectonics/conservative.html

Divergent Boundaries

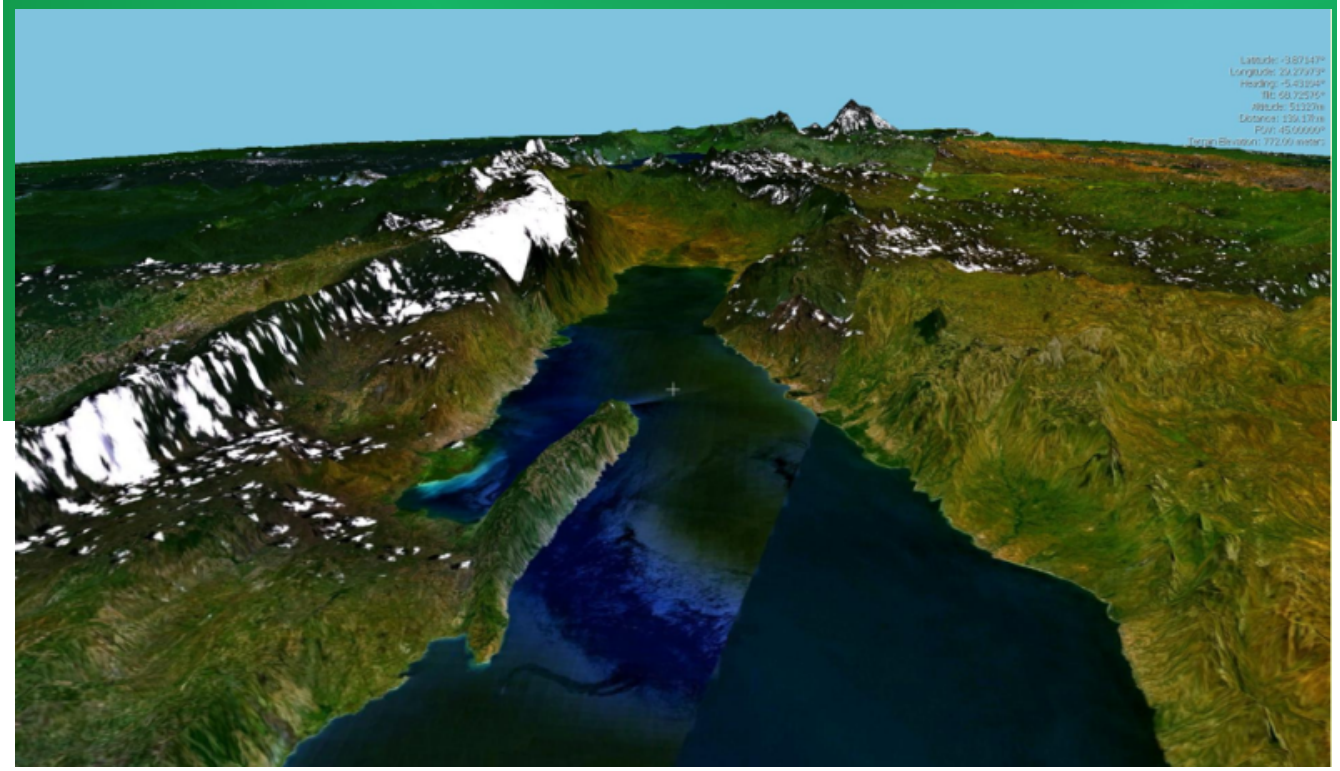
Divergent Boundary: place where two plates move apart

Most divergent boundaries occur at the mid-ocean ridge. The process known as sea-floor spreading.

Divergent boundaries can also happen on land called a rift valley.

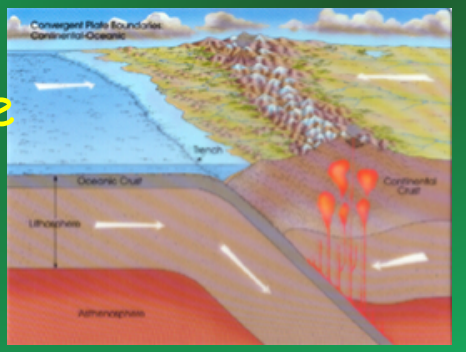


http://www.geo.lsa.umich.edu/~crlb/COURSES/270/Lec12/Lec12.html



http://www.uoguelph.ca/geology/geol2250/glossary/HTML%20files/greatriftvalley.html

Convergent Boundaries



http://www.mrsciguy.com/eq.html

Convergent Boundary: place where two boundaries come together or collide

There are three types of convergent boundaries:

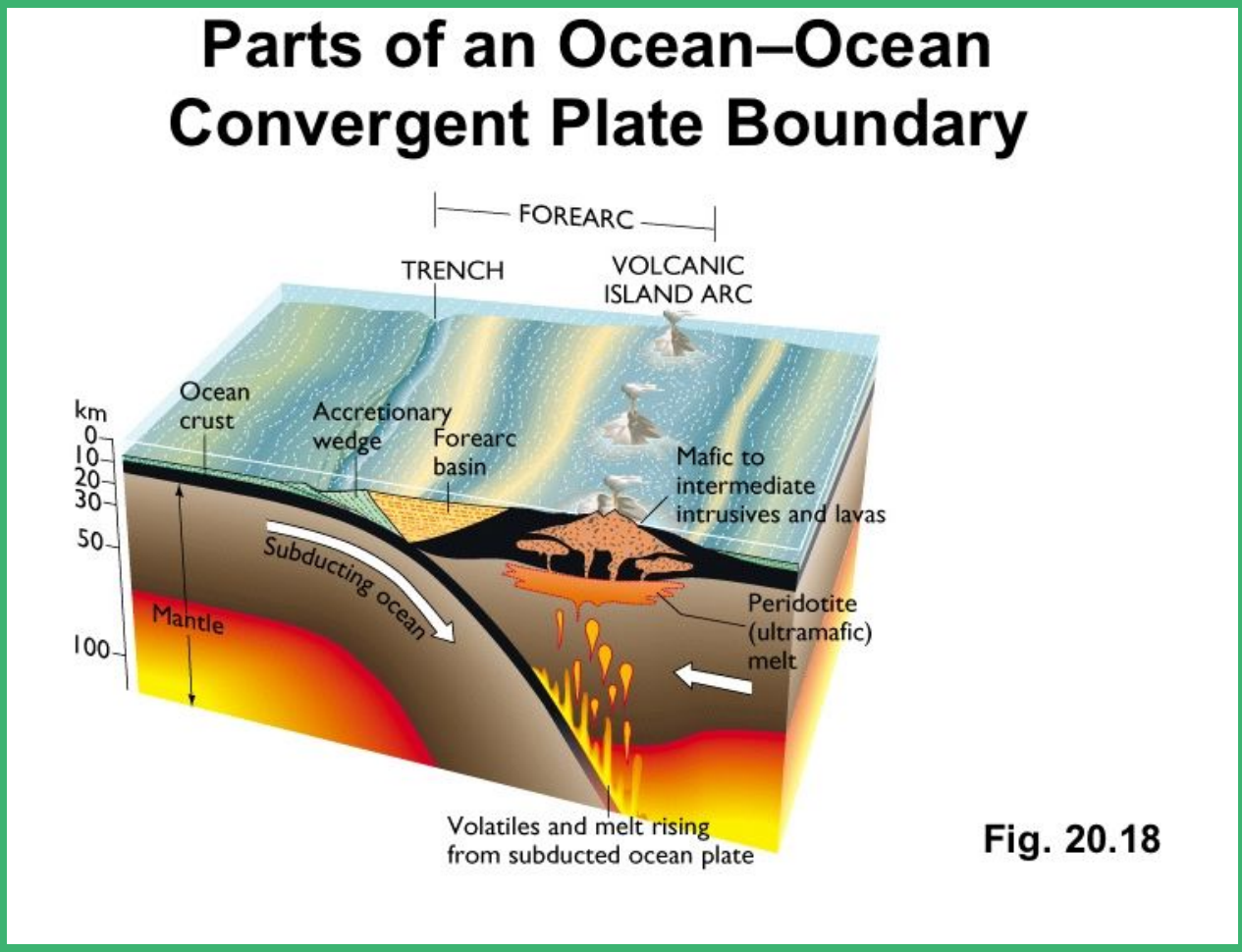
1. Oceanic Plate - Oceanic Plate
2. Continental - Continental
3. Oceanic - Continental

Example: mountains

Types of Convergent Plate Boundaries

1. Oceanic Plate vs. Oceanic Plate Convergence

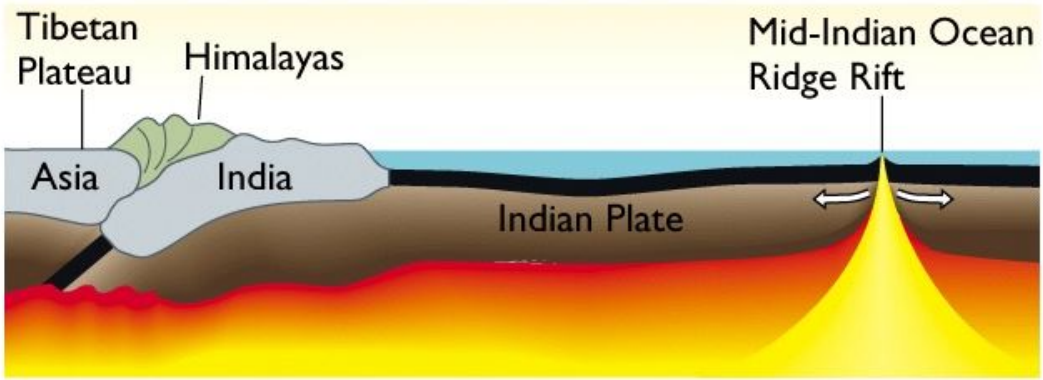
The older of the two plates descends into the subduction zone when plates of oceanic lithosphere collide along a trench.



2. Continental Plate vs. Continental Plate Convergence

The tallest mountains in the world were formed (and continue to grow) as a result of continental collision. The Himalayan mountains mark the boundary between the Indian and

Continent–Continent Convergent Boundary



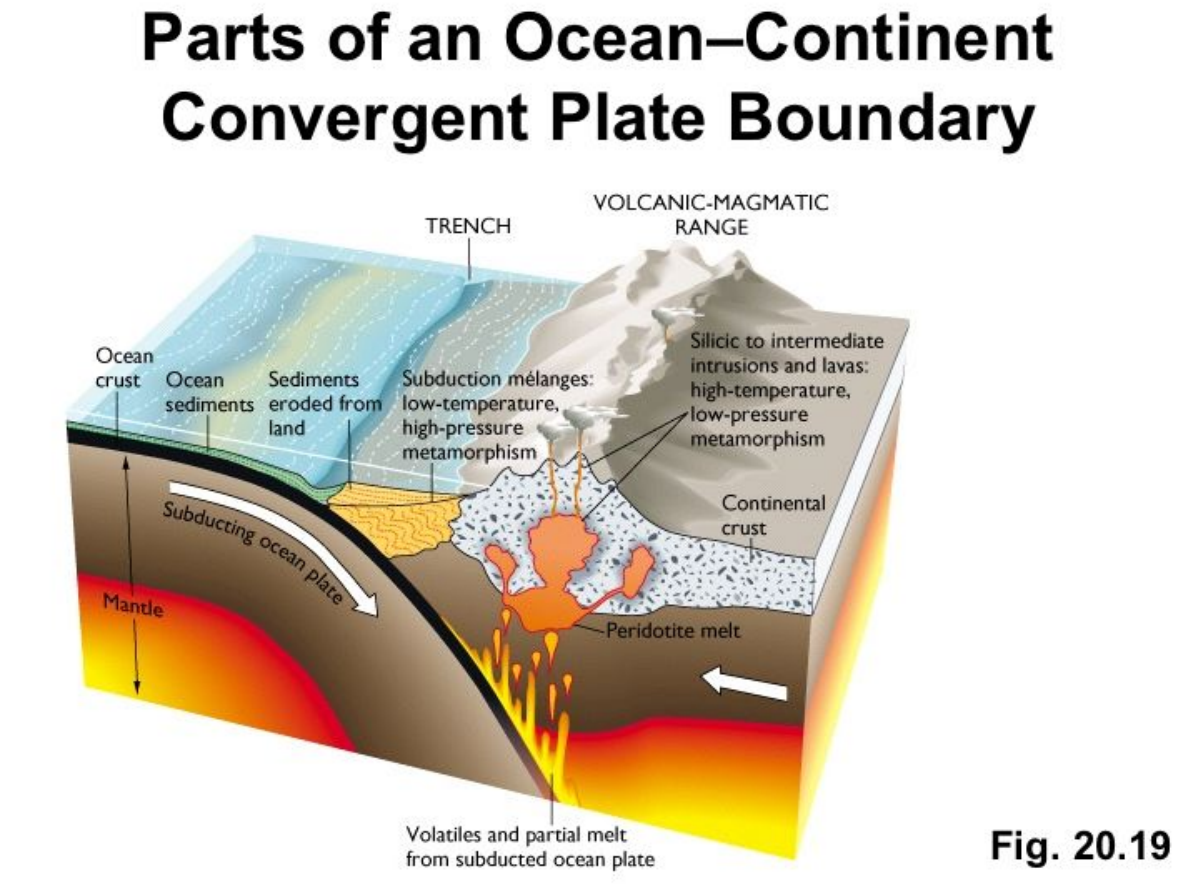
(d)

Fig. 20.d

3. Oceanic Plate vs. Continental Plate Convergence

When oceanic lithosphere collides with continental lithosphere, the oceanic plate will descend into the subduction zone. Oceanic lithosphere is denser than continental lithosphere and is therefore consumed preferentially. Continental lithosphere is almost never destroyed in subduction zones.

The Nazca Plate dives below South America in a subduction zone that lies along the western margin of the continent. Convergence between these plates has resulted in the formation of



The Continents' Slow Dance

The plates move from about 1 to 10 centimeters per year.

The North American and Eurasian plates are moving at a rate of 2.5 centimeters per year.

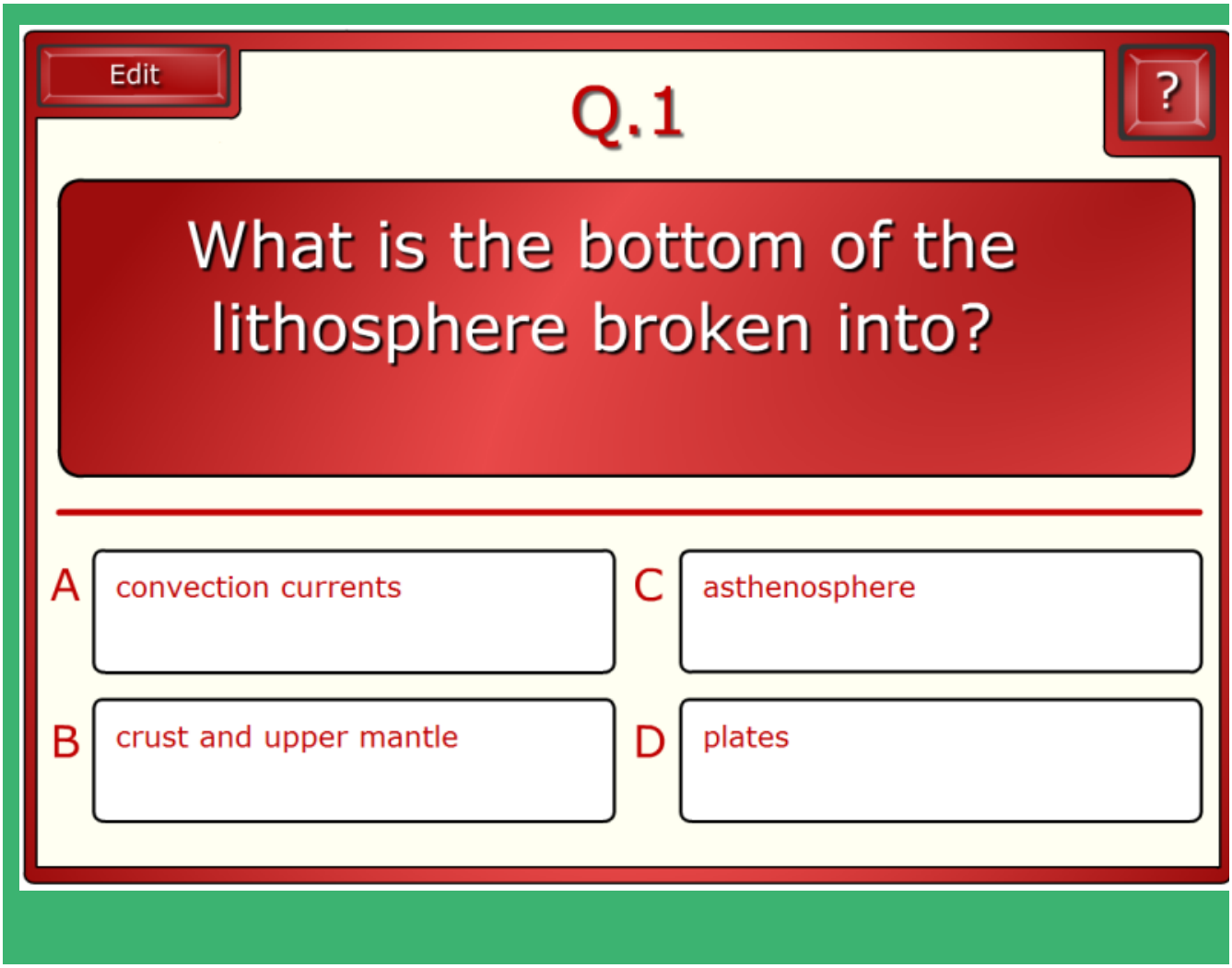
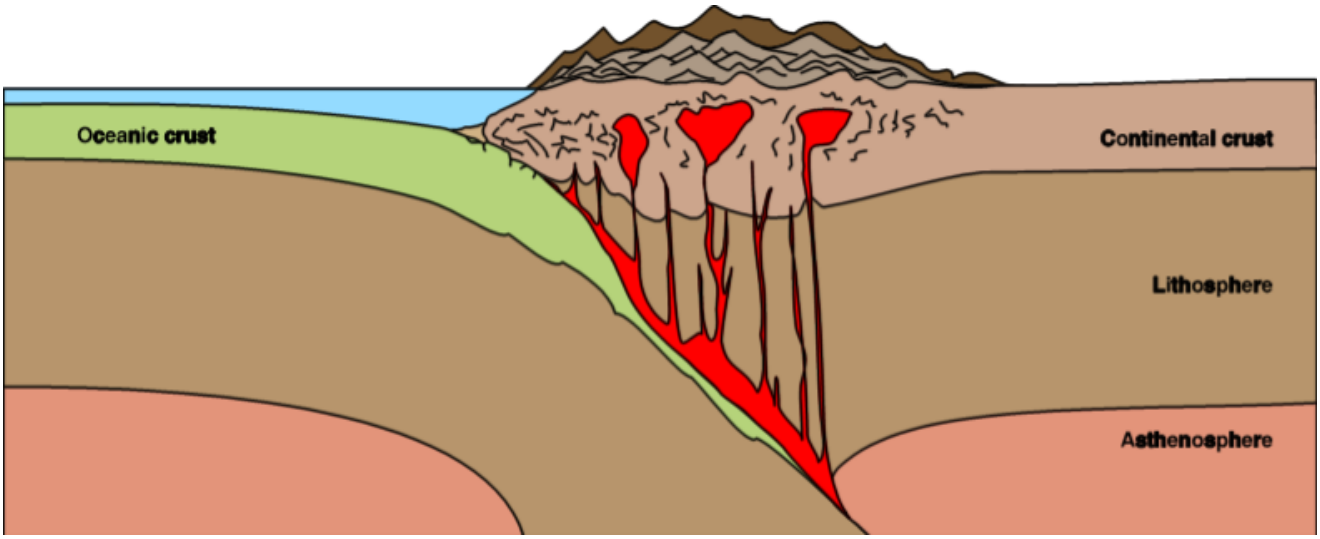
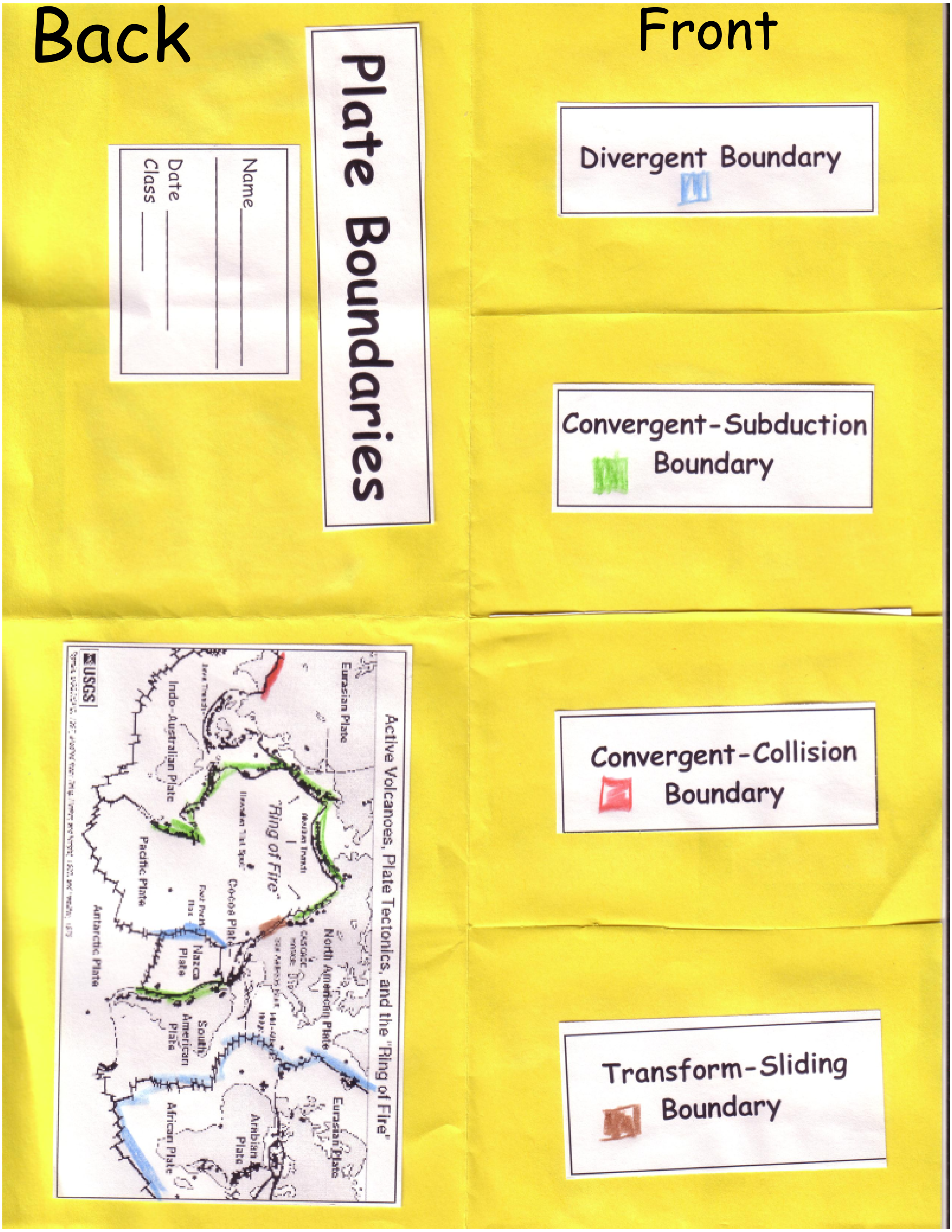

Edit
Q.1
?
What is the bottom of the lithosphere broken into?
A
convection currents
C
asthenosphere
B
crust and upper mantle
D
plates

Plate Boundary Foldable




Back
Front
Plate Boundaries
Name
Date
Class
Divergent Boundary
Convergent-Subduction Boundary
Convergent-Collision Boundary
Transform-Sliding Boundary
Active Volcanoes, Plate Tectonics, and the "Ring of Fire"
Eurasian Plate
North American Plate
"Ring of Fire"
Cocos Plate
Pacific Plate
Nazca Plate
South American Plate
Indo-Australian Plate
Antarctic Plate
African Plate
Arabian Plate
USGS


Divergent
Convergent
Subduction
Convergent
Collision
Transform