

THE GREAT TECTONIC JIGSAW OF OUR EARTH



*How the Earth's plate tectonic has crafted
mountains and oceans, incandescent volcano
and new lands.*

N.HARSHIKKHA
SENIOR'S CATEGORY-
CHETTINAD HARI SHREE VIDYALAYAM
GRADE X-JANA

INDEX

S.No	CONTEXT	Page Number
1.	HOW <i>DID</i> OUR EARTH LOOK A MILLION YEARS AGO?	3
2.	WHAT ARE TECTONIC PLATES?	4
3.	<i>HOME-MADE</i> EXPERIMENT TO SHOW TECTONIC PLATES.	5
4.	TYPES OF TECTONIC MOVEMENTS.	6,7AND 8
5.	CONVERGENT BOUNDARY-IN DETAIL	9 AND 10
6.	DIVERGENT AND TRANSFORM BOUNDARY-IN DETAIL	11
7.	DID YOU <i>ACTUALLY</i> KNOW?	12
8.	BIBLIOGRAPHY	13

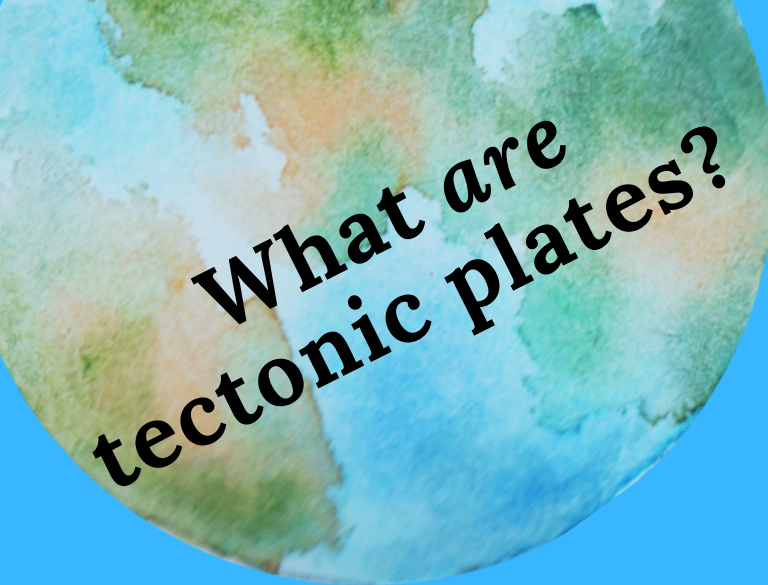
THE EVER-CHANGING FACE OF OUR EARTH



This shift of the continental landmasses is due to the **CONSTANT** movement of the tectonic plates.

My chart here, explains the comparative changes in the landscape of the Earth.





We think that the land on Earth is fixed and stable, but turns out that it is constantly moving! This movement is *way* too slow for us to notice! The part of the land that is *moving* is called the lithosphere. The lithosphere moves in big chunks of land called **tectonic plates**. Plate tectonics has become the unifying theory of *geology*. It explains the earth's surface movement, current, and past, which has created the *tallest mountain ranges and the deepest oceans*.

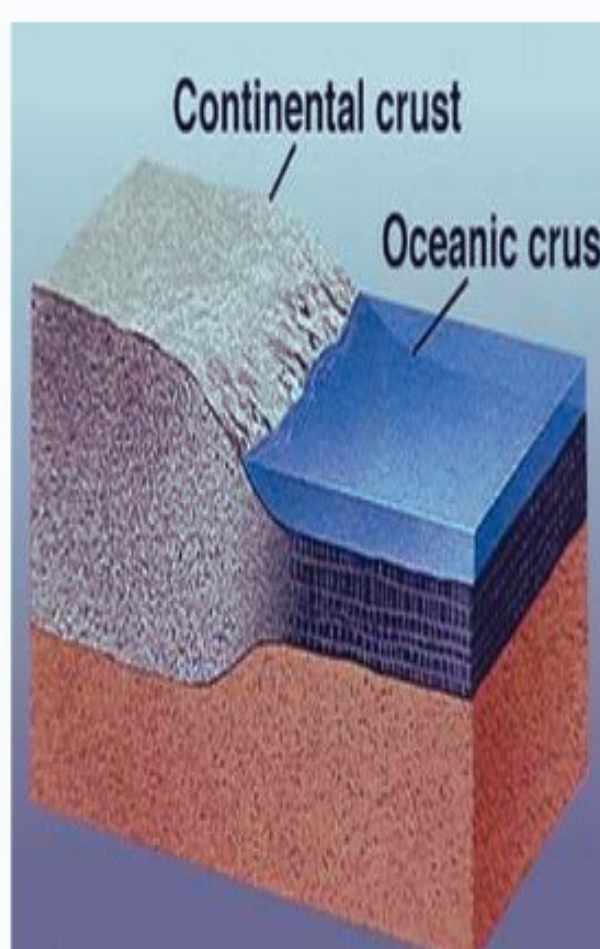
Some scientists think that the shifting plates, which have the ability to help adjust our planet's temperature over billions of years, are a vital element for life! **These tectonic plates (also called lithospheric plate) are massive, irregularly shaped slab of solid rock, generally composed of both continental and oceanic crust.**

TECTONIC PLATES

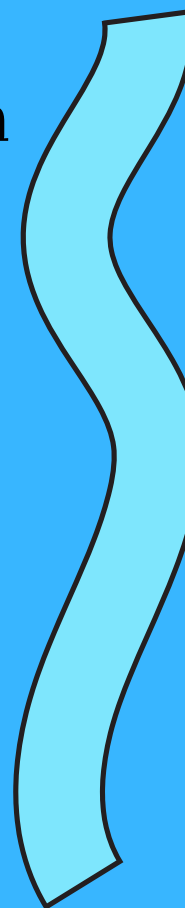


2 layers Of Crust

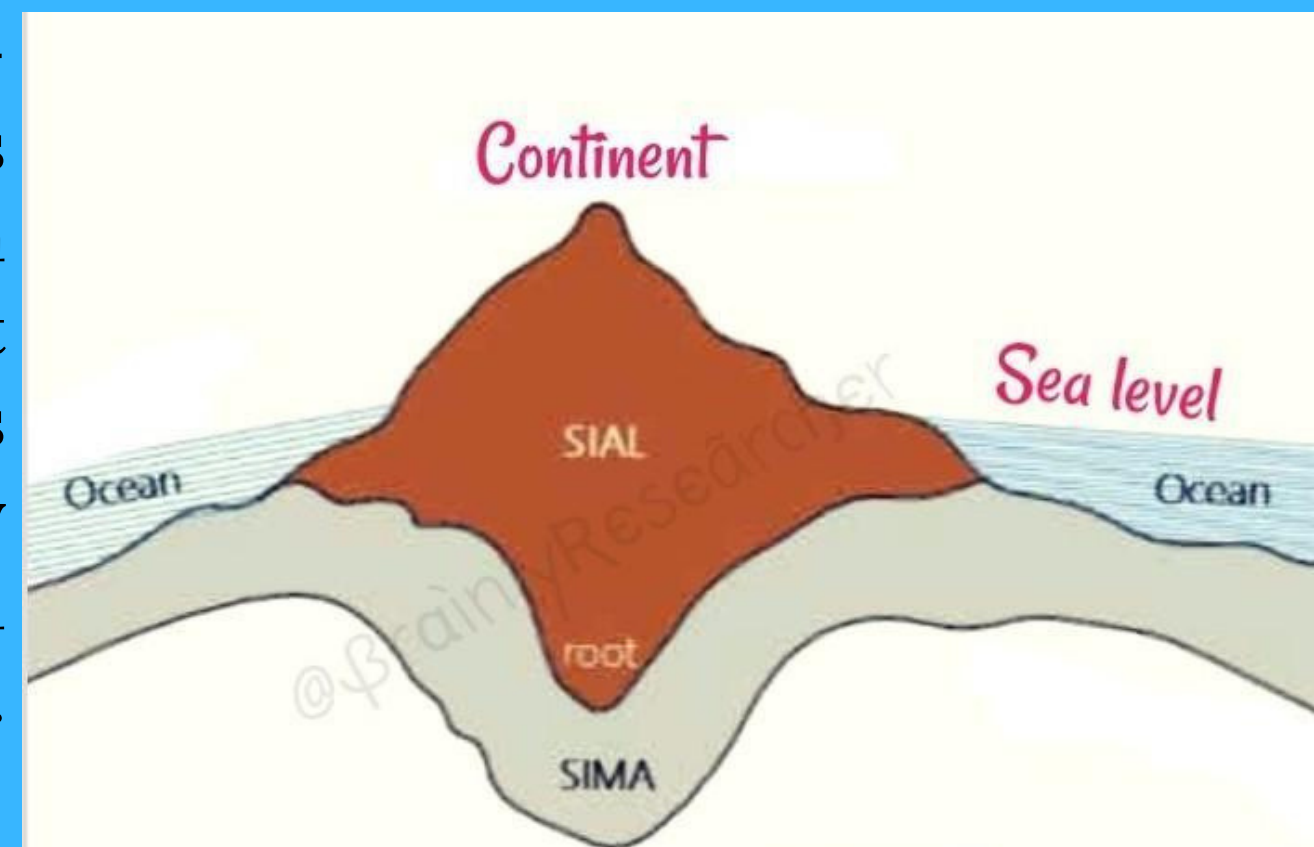
- **Oceanic crust** or Sial (very dense, made of basalt)
- **Continental crust** or Sima (less dense, made of granite)



Oceanic - Oceanic plates consist of an oceanic crust called "sima". Sima is made up primarily of silicon and magnesium (which is where it gets its name).

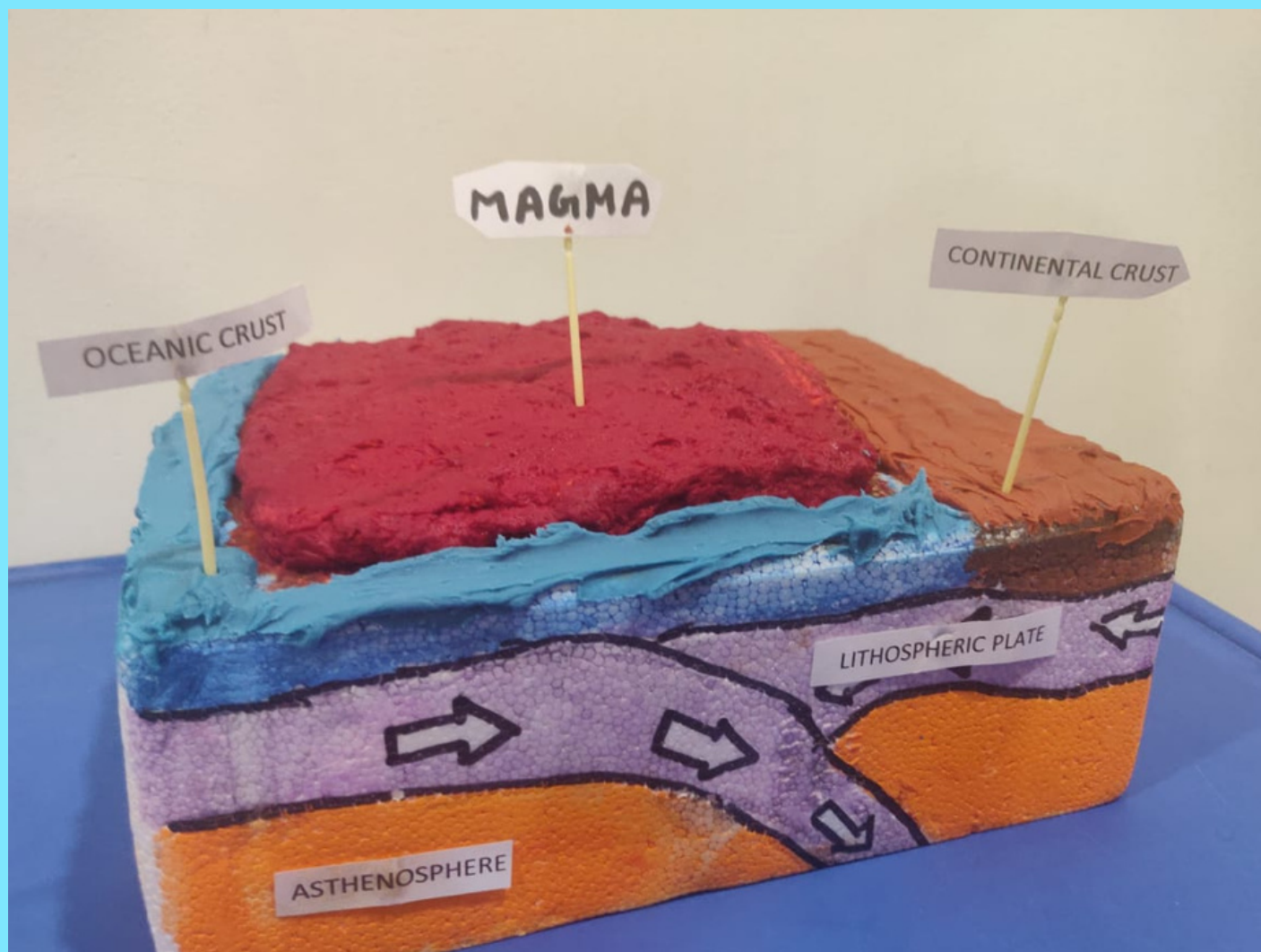
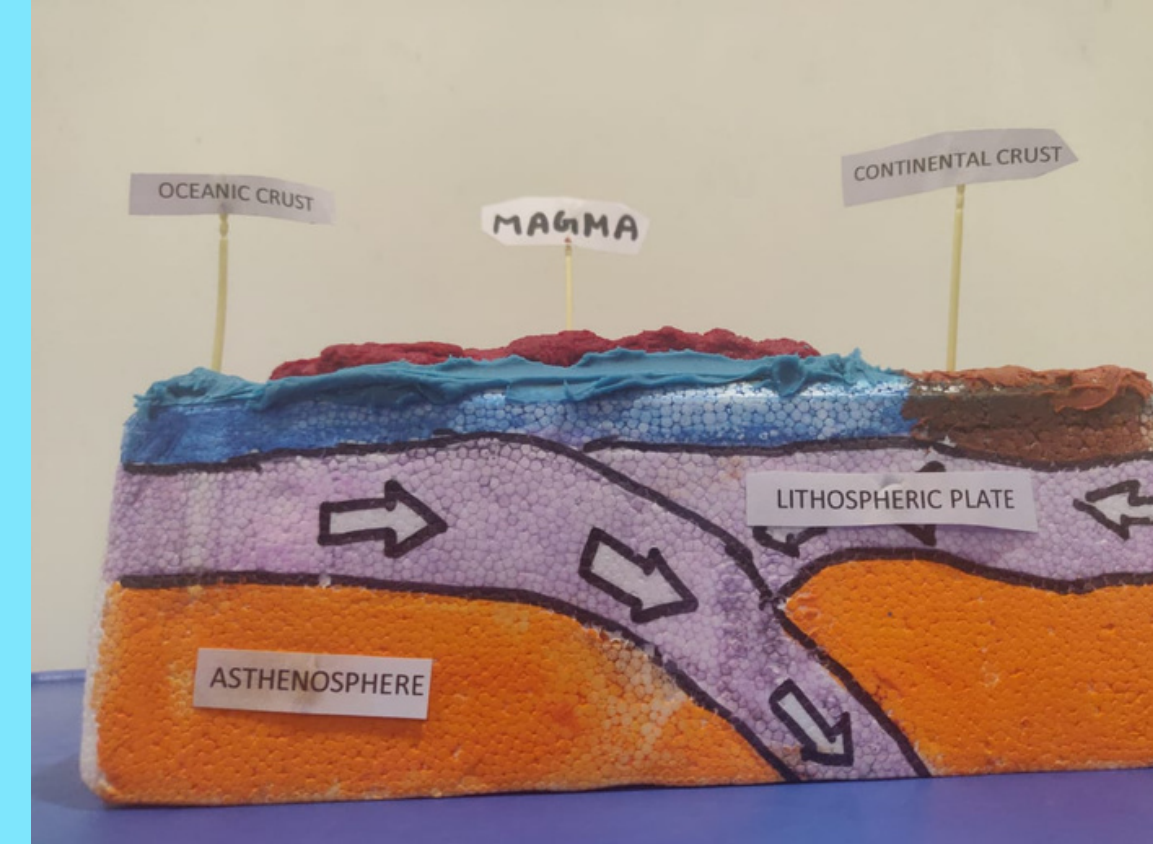


Continental - Continental plates consist of a continental crust called "sial". Sial is made up primarily of silicon and aluminum.

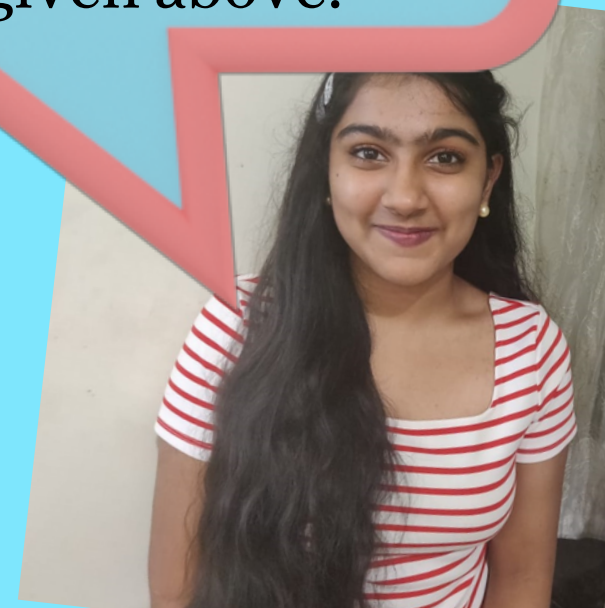


The movement of the plates creates three types of tectonic boundaries: **convergent**, where plates move *into* one another; **divergent**, where plates move *apart*; and **transform**, where plates move *sideways* in relation to each other. Please find here the 'Home Made Video' of a demonstration of the working of tectonic plates made by **me**, Harshikkha Narayanan for Geo-Genius! https://drive.google.com/drive/folders/1cNEeeXqGopS6LDHoFXRLgG_B3DzMfipy?usp=sharing

(Do not click on the link. Please copy and paste the link given above to view the video!)



These are the materials that **I**, Harshikkha Narayanan used to make this model for Geo Genius! A **thermocool base** upon which, I used **blue play-doh** to show the **oceanic crust**! **Brown play-doh** to show the **continental crust** and **refined wheat flour** mixed with **red food colour** to show...**hot magma**! Also, 2 complementary thermocol blocs to show tectonic plates! Please do watch the video to get a **real-life** experience on how tectonic plates move for which the link is given above!

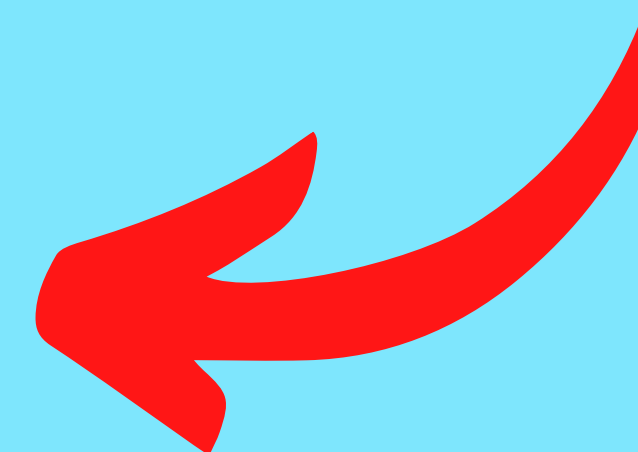
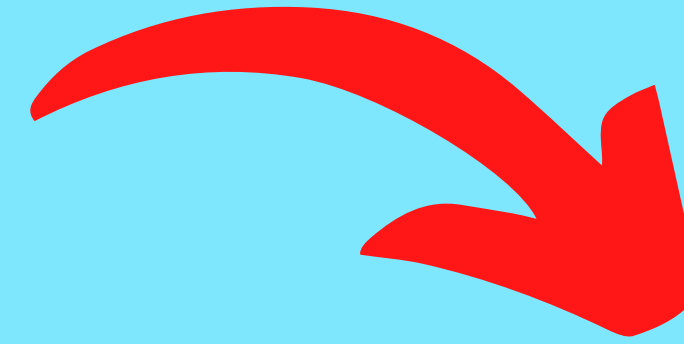
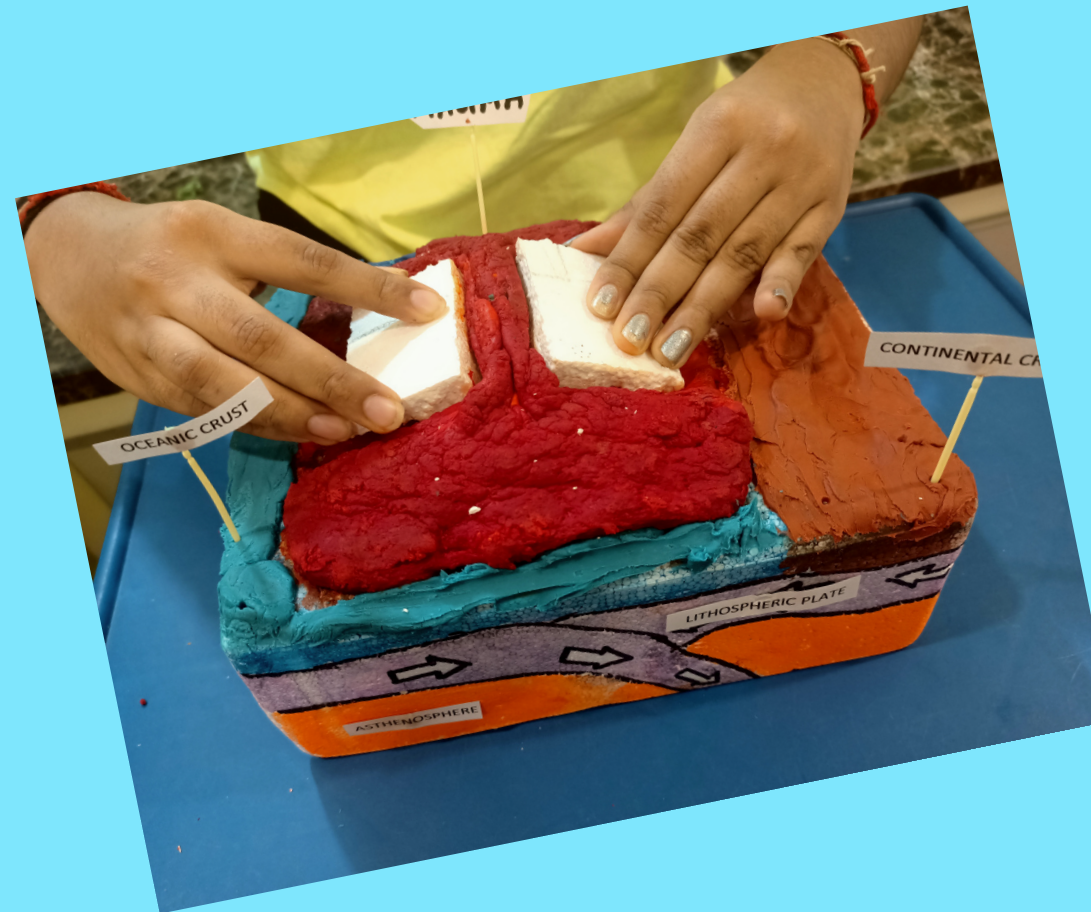
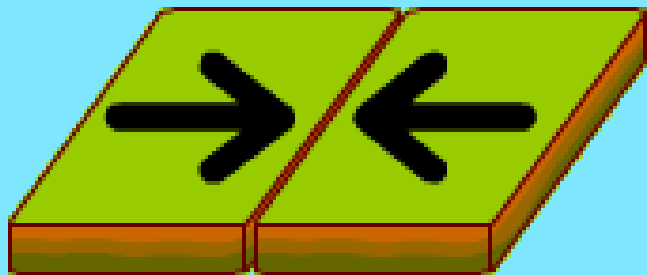


CONVERGENT

A convergent boundary occurs where two plates are pushing **toward** each other.

The boundary between:

- **Eurasian Plate** and the **Indian Plate** at the Himalayas.
- **Nazca Plate** and the **South American Plate** along the west coast of South America.

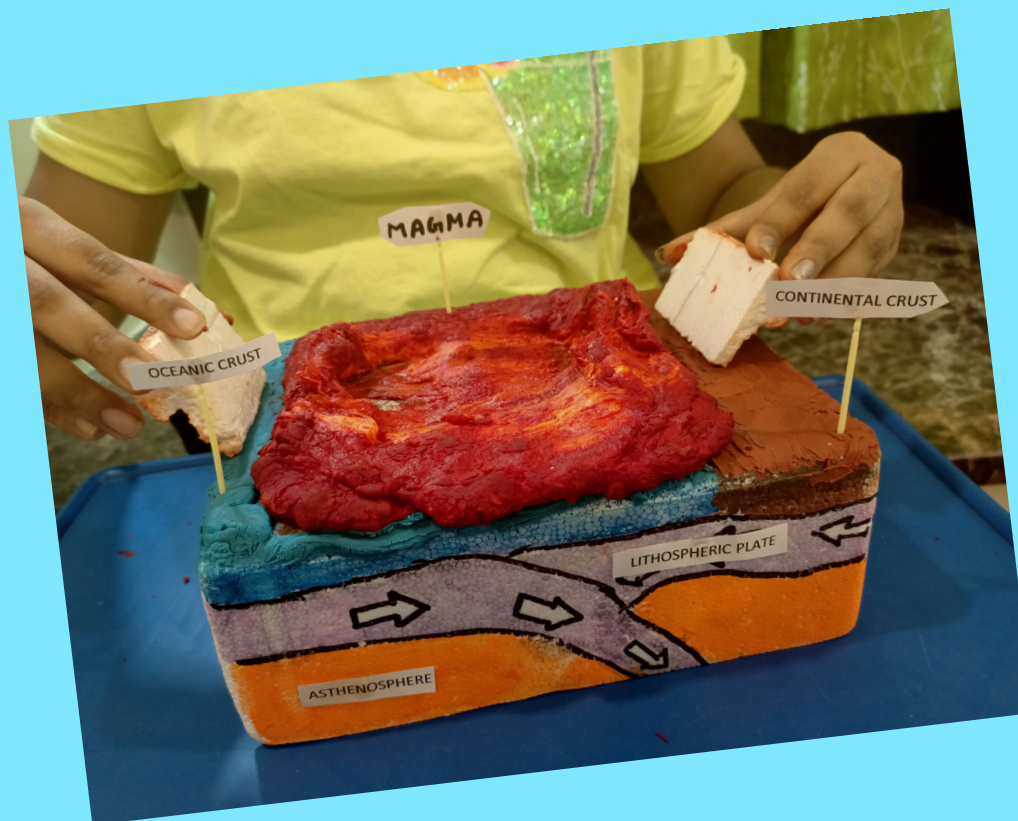
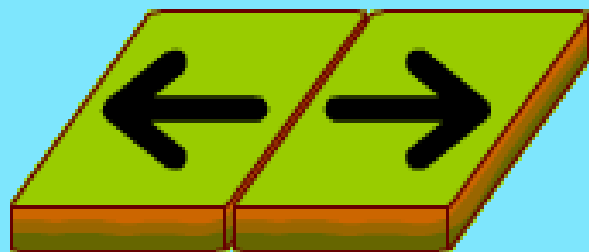


DIVERGENT

A divergent boundary marks two plates that are moving **apart** from each other.

The boundary between:

- **African Plate** and the **Arabian Plate**.
- The **Pacific** and **Antarctic** Plates.
- Mid-Atlantic Ridge, the **North American plate** and **Eurasian Plate** and the **South American** and

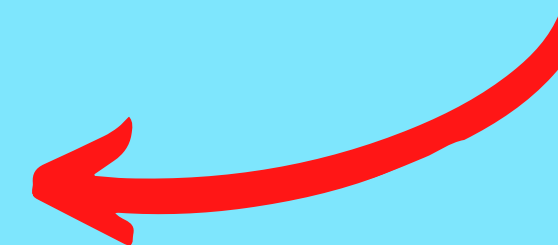
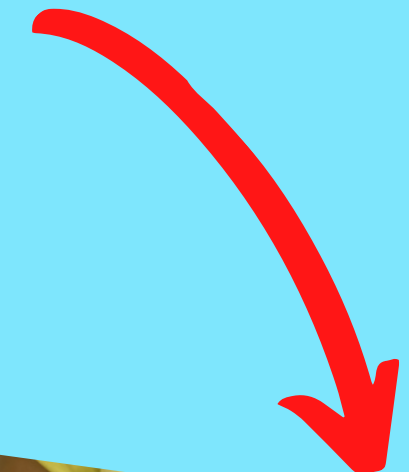
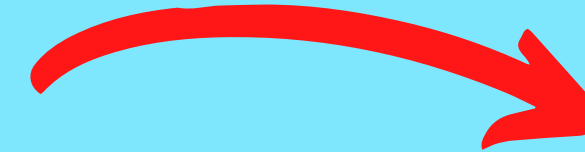
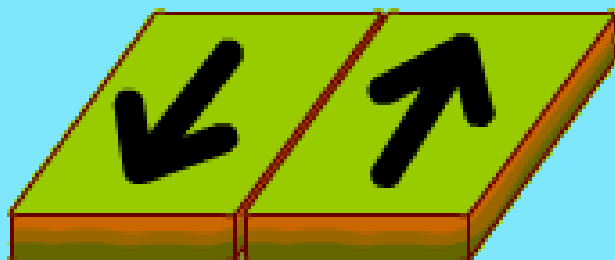


TRANSFORM

A transform boundary occurs where two plates **slide past each other**.

The boundary between:

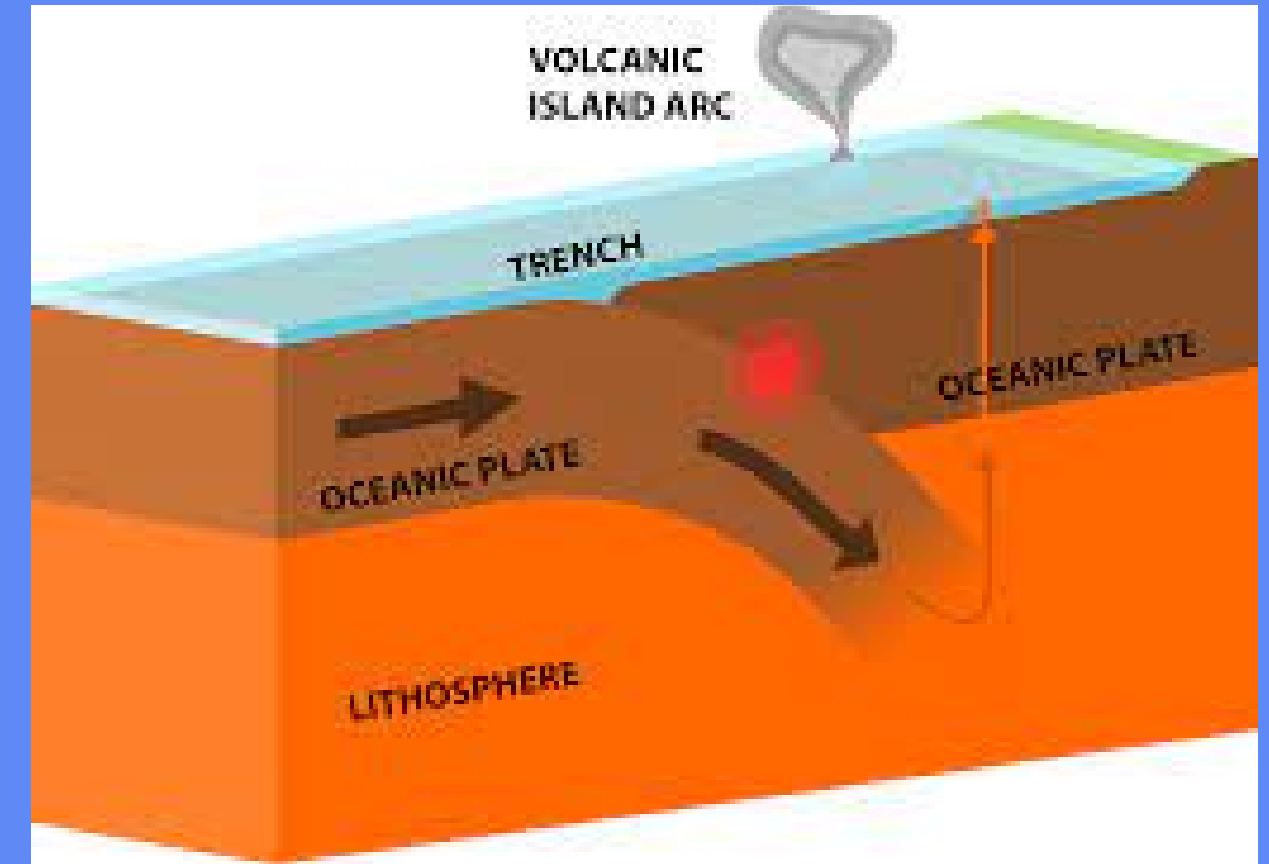
- The **Pacific Plate** and the **Australian Plate**, crossing New Zealand.
- The **Pacific Plate** and the **North American Plate** in California.



CONVERGENT BOUNDARIES

Convergent boundaries, where two plates are moving toward each other, are of three types, depending on the type of crust present on either side of the boundary – oceanic or continental. The types are ocean-ocean, ocean-continent, and continent-continent.

A convergent boundary is an area on Earth where two or more tectonic plates collide. One plate eventually slides beneath the other, by a process known as **SUBDUCTION**. The subduction zone can be defined as a plane where many earthquakes occur!



OCEANIC-OCEANIC

At an ocean-ocean convergent boundary, one of the plates (oceanic crust and lithospheric mantle) is **subducted**, under the each other. Often it is the older and colder plate that is denser and subducts beneath the younger and warmer plate.

An ocean trench marks the location where the plate is pushed down into the mantle. An Island arc is the line of volcanoes that grows on the oceanic plate.

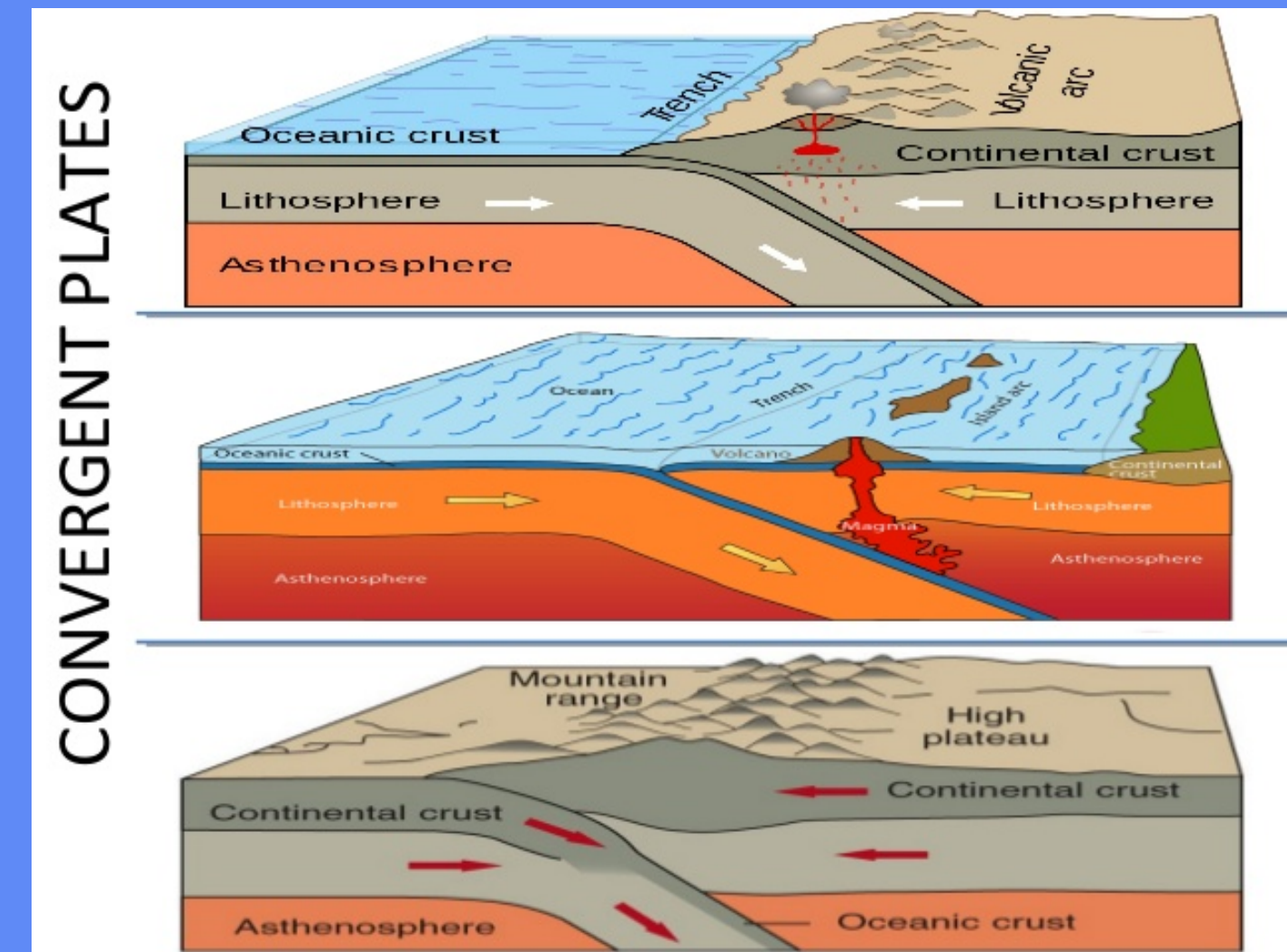
OCEANIC-CONTINENT

At an ocean-continent convergent boundary, the denser oceanic plate is pushed under the less dense continental plate in the same manner as at an ocean-ocean boundary. This movement of crust and magma causes.....**earthquakes!**

CONTINENT-CONTINENT

A continent-continent collision occurs when a continent or large island that has been moved along with subducting oceanic crust collides with another continent. The colliding continental material will not be subducted because it is too light. There is tremendous deformation of the pre-existing continental rocks, forcing the lithospheric plate upwards and thereby..**creating mountains!**

AS A RESULT--> : THE HIMALAYAS, THE ALPS, THE CHAIN OF CASCADES VOLCANOES AND THE MARIANAS TRENCH.



DIVERGENT BOUNDARIES

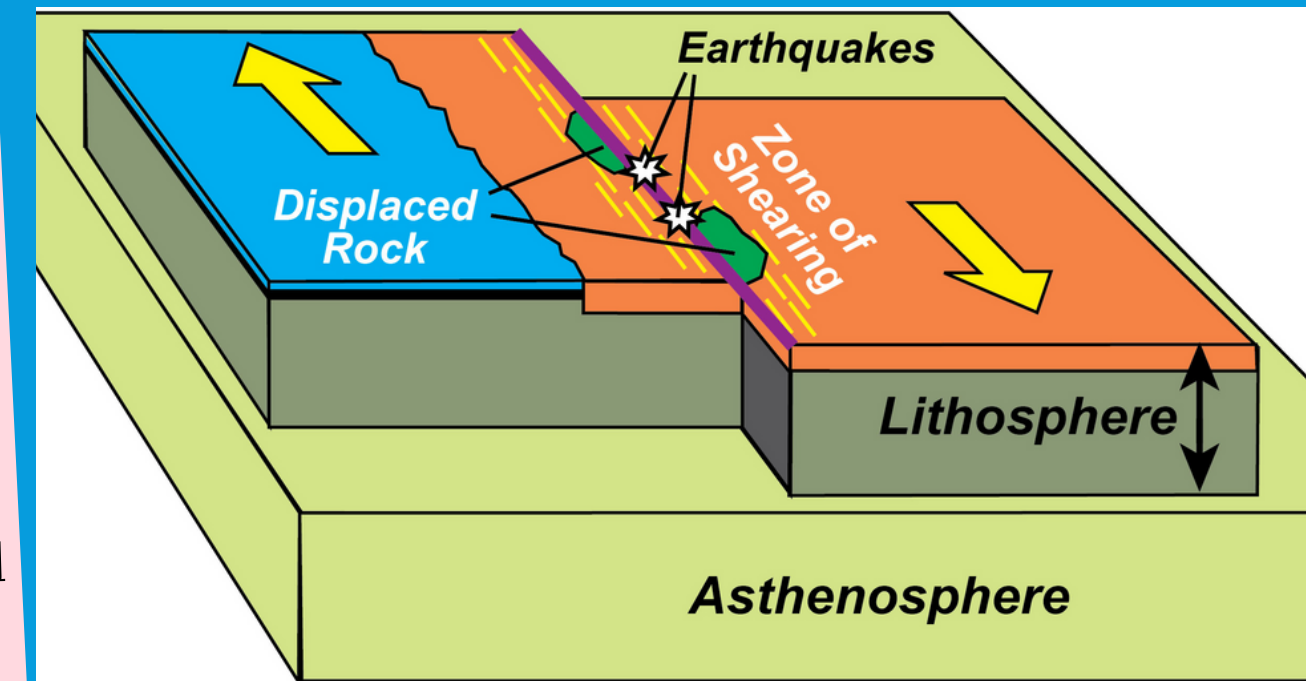
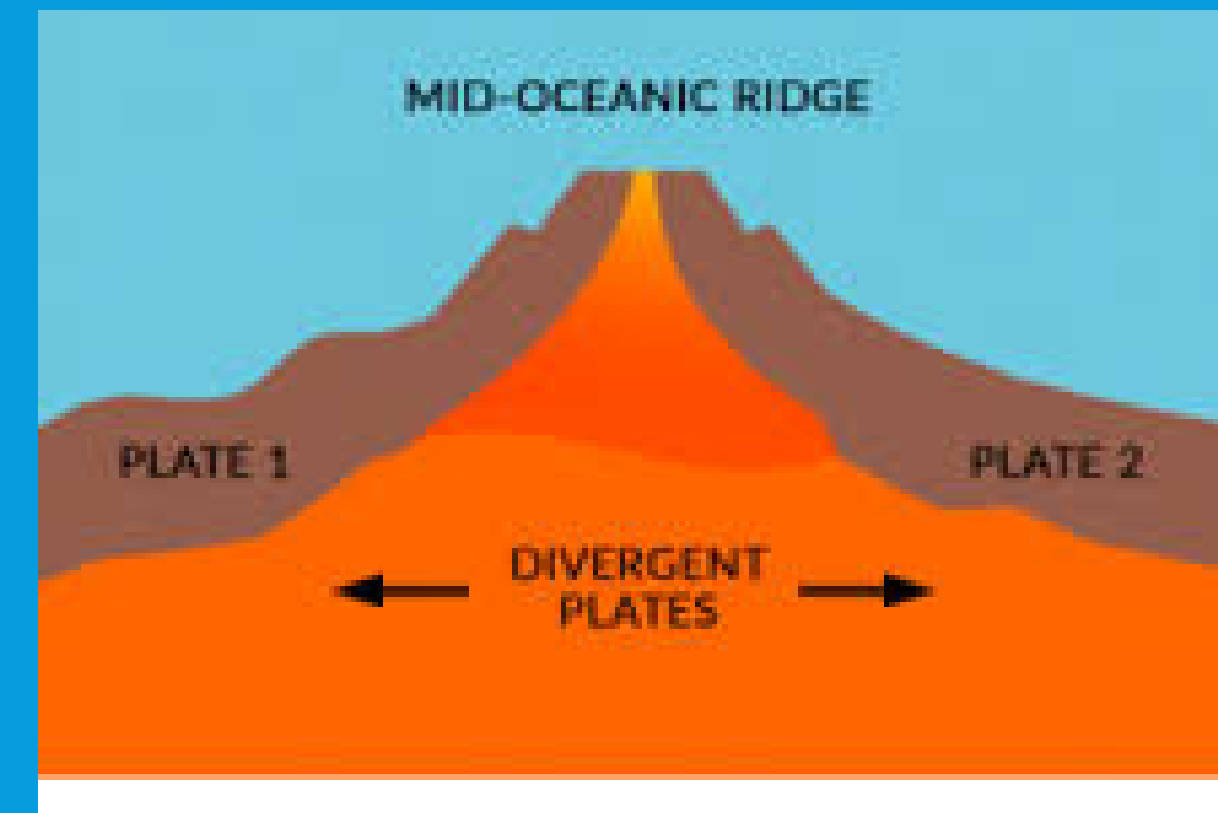
Divergent boundaries are spreading boundaries, where new oceanic crust is created to fill in the space as the plates move apart. Most divergent boundaries are located along **mid-ocean oceanic ridges**. It results in **volcanic activity** in the form of fissure eruptions; **shallow earthquake** activity; **creation of new seafloor** and a **widening of the ocean basin**.

As a Result-->KRAFT VOLCANO(ICE-LAND), mid atlantic ridge and Thingvellir Fissure Zone(ICE-LAND).

TRANSFORM BOUNDARIES

Transform boundaries exist where one plate slides past another without the production or destruction of crustal material. Transform faults connect segments of mid-ocean ridges and are thus **ocean-ocean** plate boundaries. But, a few transform faults connect continental parts of plates. Most transform faults are found on the ocean floor. They commonly activate the **spreading ridges** and produce **zig-zag plate margins**, and are generally defined by shallow earthquakes!

As a result -->: St. Paul, Romanche, the Ascension fracture zones AND the San Andreas Fault.



Picture two giant conveyor belts, facing each other but slowly moving in opposite directions as they transport newly formed oceanic crust! .

DID YOU KNOW?



- If Europe and Africa were combined as it was during the PERMIAN period, it would fit into Asia with some room to spare!
- Fossils of tropical plants are found as far north as Alaska because the North American landmass was once to be found in the tropics!
- Continental plates are up to 72 km thick, *but* the oceanic plates are only about 5 km thick!
- Ring of fire is a belt in the Pacific Ocean where most of the earthquakes and volcanoes of Earth occur.
- Parkfield, California is known as the *earthquake capital* of the world.
- Mount Everest grows approximately 44 millimetres *every* year!
- Hawaii is the home of the largest and tallest volcanoes.!



BIBLIOGRAPHY

- <https://www.nationalgeographic.org>
- <https://geo.libretexts.org>
- <https://geology.com>
- <https://www.britannica.com/science/convergent-plate-boundary>
- <https://oceanexplorer.noaa.gov/facts/plate-boundaries.html>
- <https://www.nps.gov/subjects/geology/plate-tectonics-divergent-plate-boundaries.htm>
- <http://www.geo.cornell.edu/>
- <http://www.cotf.edu/ete/modules/msese/earthsysflr/plates4.html>
- <https://sciencetrends.com/>
- <http://learningtostem.com/>
- <https://www.globaladventurechallenges.com/>
- <https://inventionsky.com/earthquake-facts/>
- Pages 14, 15 and 16 from the book updated and revised, "TELL ME ABOUT SCIENCE", published by the Chancellor Press.

Thank you! Harshiksha Narayanan signing off!

