Project: Why do earthquakes and volcanos occur at plate boundaries?

Name:

How to proceed:

(1) Read the background information on **continental drift and plate tectonics**, in the pages that follow. This information will help you answer the question above
(2) Write definitions for the required vocabulary, in the pages that follow
(3) Outline/diagram how earthquakes and volcanos work in the space provided
(4) With a team of up to 4 people, create a visual project that answers the question above, using the vocabulary below. You will have 1 prep class in the classroom, and 3 blocks in the library, to complete this project.

To make your project as clear as possible, you may wish to include some of the information you have read on continental drift and plate tectonics – You should assume that your viewer has a limited understanding of these topics prior to watching your video, and so some backstory will be helpful.

Vocabulary required in video:

- ☐ Asthenosphere
- ☐ Tectonic plate
- ☐ Pressure
- ☐ Plate boundary
- ☐ Energy release
- ☐ Fault
- ☐ Seismic waves
- ☐ Ocean crust
- ☐ Continental crust
- ☐ Subduction zone
- ☐ Magma
- ☐ Transform plate
- ☐ Convergent plate
- ☐ Divergent plate

HOW YOU WILL BE MARKED:

	5 points	4 points	3 points	2 points	1 point	0 points
Design and creativity	Project is neatly created and directions were followed	Project is good, but some parts are sloppy	Project is complete but a good portion is disorganized	Project is submitted but most of the video is disorganized	There is a project, but it is incomplete and is devoid of effort	No project was created/submitted
Vocabulary	All 14 vocabulary words are included	11+ vocabulary words are included	8+ vocabulary words are included	5+ vocabulary words are included	3+ vocabulary words are included	None of the vocabulary was included
Props/Apps	Project includes many thoughtfully-made visuals that are used appropriately	Video includes some visuals that are used appropriately	Video includes some visuals, though their use could have been more thought-out	Video includes visuals that are confusing and/or used incorrectly	Video includes visuals that actually take away from the message of the video OR the intention of the project	Video does not include ANY props or applications
Content	The video provides a very clear, concise, and scientifically-accurate message	The video provides a reasonably clear, concise, and scientifically-accurate message	The video provides a scientifically-accurate message, though lacks some clarity/accuracy	The video causes more confusion than help when it comes to explaining concepts	The video contains large errors when it comes to explaining concepts	No effort was made to make this video clear or scientifically-accurate

Final product /20

Completion of outlines /10

TOTAL: **/30**

Apps you can use to build your presentation:

Explain everything: The interactive whiteboard platform where people collaborate, share, and learn without boundaries.

Book Creator: Book Creator is a simple tool to create interactive ebooks on the web

iMovie: Use photos, recordings, and other media to create an engaging video presentation. iMovie is also a good base to create a presentation, while inserting clips from other apps

iMotion: An intuitive and powerful time-lapse and stop-motion app

Stop Motion Studio: Another app that lets you create stop-motion presentations

Chatterpix: Simply take any photo, draw a line to make a mouth, and record your voice. These images can be used to make your presentation more engaging

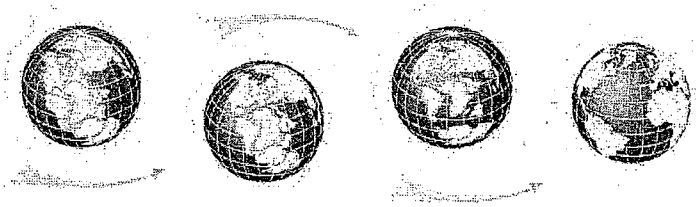
Greenscreen: Put yourself in front of background to help narrate your presentation

Continental drift - Wegener's Idea

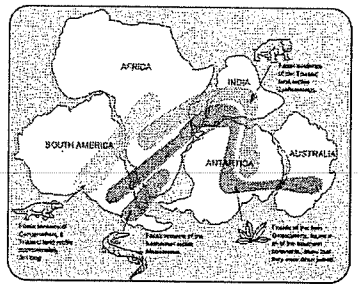
Alfred Wegener, born in 1880, was a meteorologist and explorer. In 1910, he noticed that South America and Africa appeared to fit together like puzzle pieces. He wondered if the two continents were once joined and then moved apart. He set out to find evidence to support or refute this idea. Here is the main evidence that Wegener and his supporters collected for his continental drift hypothesis:

(1) Fit of the Continents

The continents appear to fit together, and not just South America and Africa. If the continental margins are included, the fit is even better.



(2) Distribution of Fossils



Wegener found fossil evidence that the continents were once joined. The same type of plant and animal fossils are found on continents that are now widely separated. These organisms would not have been able to travel across the oceans. Wegener thought that all of these organisms must have lived side by side. The lands later moved apart so that the fossils are separated.

(3) Distribution of Rocks and Structures

Wegener found rocks of the same type and age on both sides of the Atlantic Ocean. He thought that it could not be a coincidence! He said that the rocks must have formed side by side. These rocks then drifted apart on separate continents.

(5) Glaciers

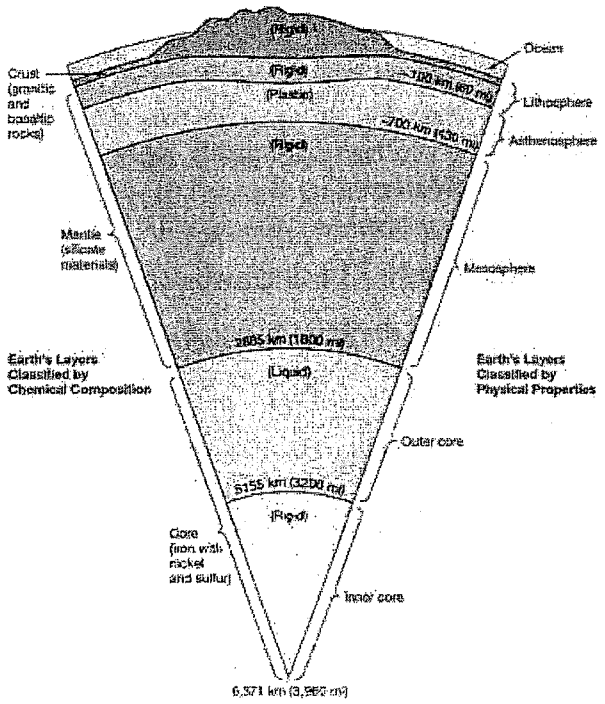
Glaciers are found in very cold climates near the poles. The evidence left by some ancient glaciers is very close to the Equator. Did glaciers once exist near the poles? If the continents had moved, the glaciers would have been centered close to the South Pole.

(6) Tropics

Coral reefs are found only in warm water. Coal swamps are also found in tropical and subtropical environments. Wegener discovered ancient coal seams and coral reef fossils in areas that are much too cold today.

Earth's layers

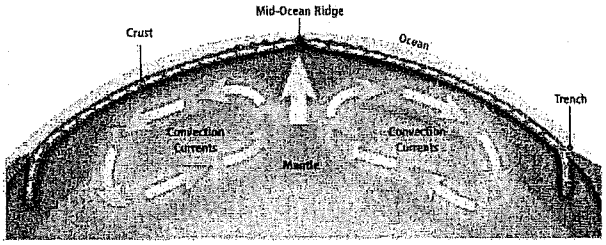
If we could cut Earth open, we'd see the **inner core** at the center, then the **outer core**, the **mantle** in the middle and the **crust** on the outside. If you are talking about plates, though, there's the brittle **lithosphere** riding on the plastic **asthenosphere**.



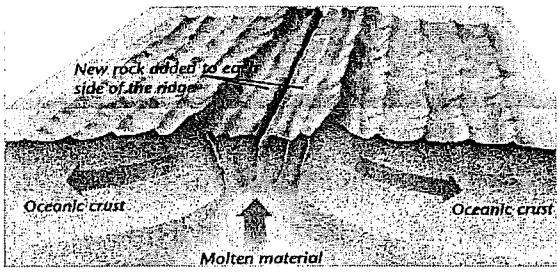
The crust is less than 1% of Earth by mass. The mantle is hot, ultramafic rock. It represents about 68% of Earth's mass. The core is mostly iron metal. The core makes up about 31% of the Earth.

The **lithosphere** is composed of both the crust and the portion of the upper mantle and behaves as a brittle, rigid solid. The **asthenosphere** is partially molten upper mantle material and behaves plastically and can flow.

Not long after Wegener's death, scientists recognized that there is **convection** in the mantle. Deeper material is hotter and so it rises. Near the surface, it becomes cooler and denser so it sinks. This creates a **convection cell** in the mantle.



Formation of convection cells



Seafloor spreading

Seafloor spreading is a geologic process in which tectonic plates—large slabs of Earth's lithosphere—split apart from each other. Seafloor spreading occurs at divergent plate boundaries. As tectonic plates slowly move away from each other, heat from the mantle's convection currents makes the crust more plastic and less dense. The less-dense material rises, often forming a mountain or elevated area of the seafloor.

Eventually, the crust cracks. Hot magma fueled by mantle convection bubbles up to fill these fractures and spills onto the crust. This bubbled-up magma is cooled by frigid seawater to form igneous rock. This rock becomes a new part of Earth's crust.

Plate Tectonics Theory

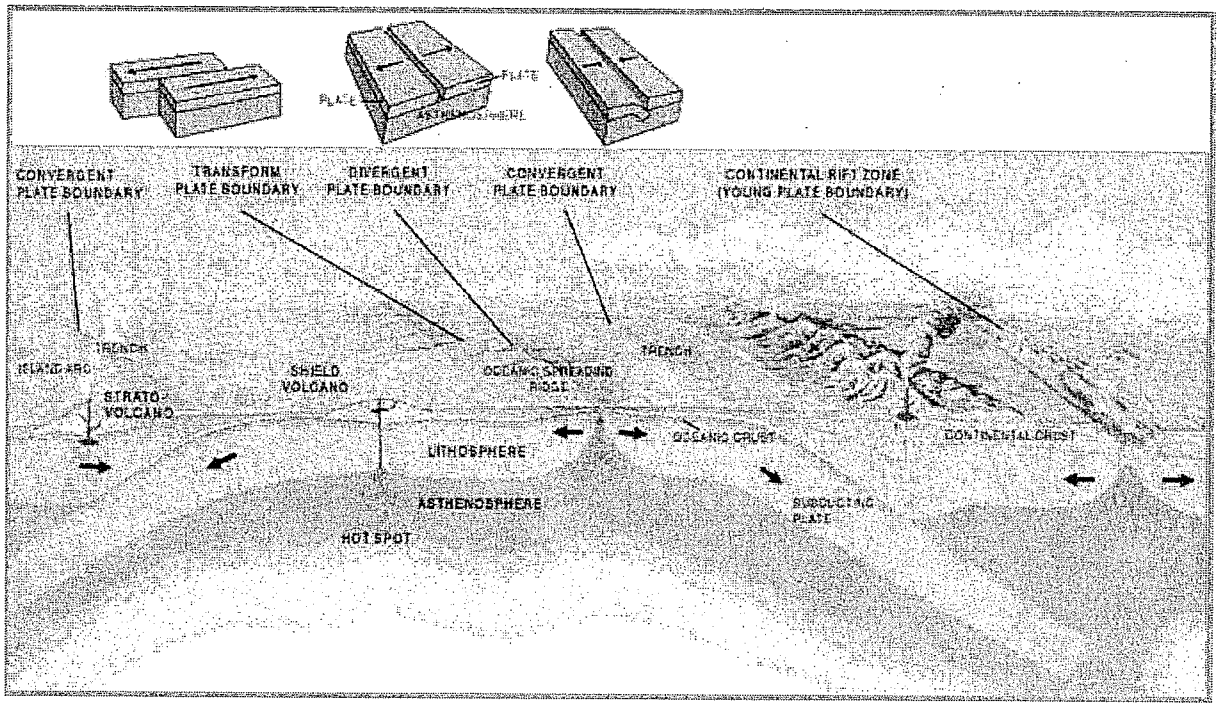
The theory of plate tectonics is what brings together continental drift and seafloor spreading. Plates are made of lithosphere topped with oceanic and/or continental crust. The plates are moved around on Earth's surface by seafloor spreading. Convection in the mantle drives seafloor spreading. Oceanic crust is created at mid-ocean ridges. The crust moves outward from the ridge over time. The crust may eventually sink into the mantle and be destroyed. If a continent sits on a plate with a mid-ocean ridge, the continent will be pushed along.

Plate Boundaries

Two plates meet at a **plate boundary**. There are three types of plate boundaries since there are three ways that plates can meet.

Convergent plate boundary: Plates move toward each other
Divergent plate boundary: Plates can move away from each other
Transform plate boundary: Plates slide past each other

Most geological activity takes place at plate boundaries. This activity includes volcanoes, earthquakes, and mountain building. The activity occurs as plates interact. Giant slabs of lithosphere moving around can create a lot of activity! The features seen at a plate boundary are determined by the direction of plate motion and by the type of crust found at the boundary.



Required Definitions:

Asthenosphere

Tectonic plate

Pressure

Plate boundary

Energy release

Fault

Seismic waves

Ocean crust

Continental crust

Subduction zone

Magma

Transform plate

Convergent plate

Divergent plate

Outline: How do earthquakes occur?

Outline: How do volcanos occur?

Project outline – How will you answer the question '**Why do earthquakes and volcanos occur at plate boundaries?**' Feel free to sketch out some ideas, and map out how you will build your video.