**5E Template- Science**

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| **Name: Beth Gall** | **Date: 7/13/11** |
| **Content Area: Earth Science** | **Grade Level(s): 9** | **Topic(s): Earthquakes, Volcanoes and Plate Tectonics** |

**Standards (SOL)**

*ES.7,*

*Es.1d*

**Objectives (UKD’s)**

*Students will investigate and understand geologic processes such as plate tectonics by relating earthquake and volcanic activity with all plate boundaries.*

**CTA Session/ Resources** – Data-Based Lessons – Chris Kaznosky

**Materials & Resources**

*USGS Data sheet – Latest Earthquakes in the World\*, USGS Data sheet – Recent Volcanic Activity\*, a world map indicating plate boundaries and one without plate boundaries*

\*<http://www.volcano.si.edu/reports/usgs/>

\*<http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/quakes_all.php>

**Safety Considerations**

*None*

**Engage – Time Estimate – 5 minutes**

*Ask students how they would know if they had a crack in a bone if they can’t see inside of their body.*

*Then ask students how we might find a crack on the ocean floor when we can’t see it. Make the connection between the 2 questions. A compound fracture may yield blood and a crack in the Earth may* *yield lava. A broken bone will cause pain, a crack in the Earth will cause pain when an earthquake happens.*

**Explore – Time Estimate – 45 minutes**

Students will work independently in most cases. If this activity is used with an inclusion class, it may be appropriate to pair students. This will provide assistance for slower working students, by helping them locate points quicker.

1. *Give students a copy of a world map without any plate boundary lines and copies of the USGS data for recent Earthquakes and Volcanoes.*
2. *Tell students to plot\* recent Earthquakes on the map using blue dots.*
3. *Then plot\* volcanoes using red dots.*

*\*Note that data provided is given in positive and negative latitudes and longitudes. Positive latitudes are north of the equator. Negative latitudes are south of the equator; Positive longitudes are east of the Prime Meridian and negative longitudes are west of the Prime Meridian*

1. *While students are working, circulate around the room to insure they are on task and plotting correctly.*
2. *When students are done, stop and ask students if they observe any patterns.*
3. *After a brief discussion, give students a world map with plate boundary lines indicated. Ask them to compare the map with their plotted points and the map with plate boundaries.*

**Explain -- Time Estimate – 10 minutes**

1. *Ask students to explain what they notice about the 2 maps. Help them to see that the points they plotted are falling on plate boundary lines. Connect to the “Engage question”….. How do we find cracks (plate boundaries) on the ocean floor when we can’t see it? Lead students to the conclusion that by locating volcanoes and earthquakes first, the boundaries will become apparent.*
2. *Relate that most large scale, high-energy events of geologic activity such as volcanoes and earthquakes occur as a result of relative plate motion along plate boundaries.*

**Extend – 45-90 minutes**

*Now that plate boundaries are located, begin discussion of divergent, convergent and transform boundaries. Boundaries on the map can now be color coded based on the type.*

**Evaluate – 20 minutes**

Students can come to a large laminated map at the front of the room and take turns locating points on the map.

Then students will be given a map with important volcanoes indicated and plate boundary lines drawn in. Students will be asked to label points as divergent, convergent or transform boundaries. This evaluation will not occur immediately after this activity as more practice will be needed.

**Plans for Diversity**

*Special needs students will likely need help with the plotting of points using positive and negative values for latitude and longitude.*

**Connections**

*This lesson will help students review latitude and longitude and plotting points on a map. It will give a basis for discussion as current events arise related to volcanoes, earthquakes or tsunamis.*