

Plate Tectonics & Land Forms

A Community in the Classroom Presentation for Grade 4

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STANDARDS CONNECTION

Grade 4 Earth Science: The continents are situated on plates, floating at the uppermost layer of the Earth. The results of plate interactions include the landforms around us and dynamic geologic processes (earthquakes, volcanoes).

INSPIRATION AND INVOLVEMENT

Morgan is a geophysics student at UC, Berkeley. He has taught students between grade 5 and undergraduate. He will discuss the different interactions of plates and the ways in which mountains are created. In small groups, the class will try to identify these landforms at different locations around the world, and thus identify plate boundaries.

VOCABULARY

crust. We will discuss convergent, divergent and transform plate margins

LEARNING EXPERIENCES

Demonstration/Activity: The continents are located on plates, which are floating on the mantle. The plates can move relative to each other and interact in different ways. This happens over a very long time (millions of years), however certain plate interactions happen on short timescales, such as earthquakes.

Activity: In small groups, use foam models to explore the interactions of tectonic plates and the resulting landforms. Use maps to identify those landforms that might result from the interactions of plates at their boundaries.

Discussion: After exploring the plate interactions with foam models and maps, we'll talk about the different observations and use the observations to identify some plate boundaries.

Goals

- Understanding plate tectonics – continents and oceans are located on plates moving above mantle
- Understand three types of plate boundaries and associated land forms/ geologic activity. Associated features include mountain ranges, rift valleys, divergent margins (E. Pacific rise), earthquakes, volcanoes.
- Vocabulary: plates, earthquakes, volcanoes, crust. Discuss: subduction/ convergent, transform, collisional, divergent.

Engage

- Continents are located on plates “floating” on the mantle
- Movement of continents and plate interactions
- Demo with foam blocks in groups
- Discussion of timescales: earthquakes happen in less than a minute, plates moving at 3 cm/year, 10-50 million years to build mountains, volcanic eruptions can happen over days to years (but volcanoes are built over millions of years), separation of continents ~200 million years.
- Class background and connections: has anyone felt an earthquake, been near a volcano. Round Top in Berkeley Hills is 10 million years old.

Explore

- As a class, brainstorm features associated with plate boundaries – mountain ranges, earthquakes, volcanoes
- Where do we know that these features occur?
- In small groups, students look at topographic maps and try to identify features.

Explain

- Review observations from different groups and compile on big map
- Outline the major plates and relate observations to plate movements

Extend/ Wrap-up discussion

- Two types earth crust – oceanic and lithospheric crust (with diff. densities/ weights)
- What happens when two types crust collide?
- Short discussion of tsunamis ??

Evaluation

- In small groups, draw differences between oceanic and lithospheric collisions. Can these be seen anywhere on the map?

Materials:

- Plate distributions: <http://www2.nature.nps.gov/geology/usgsnps/animate/A06.gif>
- Animation: Movements of continental plates: <http://www2.nature.nps.gov/geology/usgsnps/animate/A08.gif>
- Richard Robinson plate animation – quicktime version

- Nice shockwave demo with four plate interactions:
<http://www.pbs.org/wgbh/aso/tryit/tectonics/#>
- Video: the day the earth shook (Northridge/Kobe comparison), NOVA, AVMC-VIDEO/C 5674
- Blue planet world map: http://www.edugraphics.net/gm2-world_maps/gm245-da.htm
- Gif-file world map with topography in varying color
- Jpeg-file world map, favorite option of those seen