Elevation and Plate Tectonics

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Grade Level	8 and High School
Duration	1 class period

National Standards	AZ Standards	Arizona Social Science Standards
GEOGRAPHY **Element 1: The World in Spatial Terms** 1. How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information 3. How to analyze the spatial organization of people, places, and environments on Earth's surface **Element 2: Places and Regions** 4. The physical and human characteristics of places **Element 3: Physical Systems** 7. The physical processes that shape the patterns of Earth's surface **Element 5: Environment and Society** 15. How physical systems affect human systems	**MATHEMATICS** **Statistics and Probability** 8.SP.1. Construct and interpret scatter plots for bivariate measurement data to investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. **Standards for Mathematical Practice** 8.MP.4. Model with mathematics. **SCIENCE** **Earth and Space** Plus HS+E.E1U1.6 Obtain, evaluate, and communicate information of the theory of plate tectonics to explain the differences in age, structure, and composition of Earth's crust.	**The use of geographic representations and tools helps individuals understand their world.** 8.G1.1 Use geographic tools and representations to analyze historical and modern political and economic issues and events. Key tools and representations such as maps, globes, aerial and other photos, remotely sensed images, tables, graphs, and geospatial technology HS.G1.1 Use geographic data to explain and analyze relationships between locations of place and regions. Key tools and representations such as maps, remotely sensed and other images, tables, and graphs HS.G1.2 Use geospatial tools and related technologies to construct relevant geographic data to explain spatial patterns and relationships. Key tools and representations such as Google Earth, story mapping, wayfaring apps, and other geospatial technologies **Human-environment interactions are essential aspects of human life in all societies.** HS.G2.1 Analyze interactions within and between human and physical systems.

Overview

Is there a relationship between elevation of land and plate tectonics? Would this make a difference in where people might choose to live?

Purpose

In this lesson, students will plot the highest and lowest points of 10 selected countries and discover the relationship between elevation and plate tectonics.

Materials

- Data Table Worksheet
- Scatter Plot Graph Paper
- Data Table 2 Worksheet
- Scatter Plot Answer Key
- Where Plates Collide: Land Area map https://geoalliance.asu.edu/sites/default/files/maps/Where_Plates_Collide.pdf
- Math and Geography Assessment and Answer Key

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Objectives

The student will be able to:

1. Plot coordinate pairs on a scatter plot.
2. Interpret data from the scatter plot to reach a conclusion about the relationship between relief and plate tectonics.
3. Identify how plate tectonics can affect humans.

Procedures

Prerequisite Knowledge: Students should have experience in constructing and interpreting scatter plots.

1. Distribute the Data Table Worksheet and ask the students, “Based on the high and low elevations, can you make a general prediction on what countries will have plate collision going on?” Have students put their predictions in the empty boxes titled “Plate Collision or Not.” Have a few students share their predictions and explain their thinking in making this prediction. Record these on the whiteboard.
2. Direct students to plot the coordinate pairs on the Scatter Plot Graph Paper after reviewing the axes with the students. When the students place their circles on the graph paper, ask them to label the name of the country next to the circle. Have them make Prediction #2 on the Data table Worksheet.
3. Distribute the Where Plates Collide: Land Area map identifying the collision plates. https://geoalliance.asu.edu/sites/default/files/maps/Where_Plates_Collide.pdf Distribute Data Table 2 Worksheet.
4. Using the map, have the students fill in the column identifying whether the plate is colliding or not on Data Table 2 Worksheet. Also, have them draw an oval around the "YES" countries and "NO" countries on the Scatter Plot Graph Paper.
5. Discuss with the class the fact that the places on Earth with the highest mountains are the places where tectonic plates collide. These are high mountain chains like the Himalayan Mountains (China), the Andes Mountains (Bolivia), the Alps (Austria, France), and in Alaska (United States). Places of low relief (little difference in elevation between high and low) are places distant from collision zones (Australia, Denmark, Iceland, Israel, United Kingdom).
6. Conclude class with a discussion of how earthquakes can affect people and how can people be prepared for these natural disasters.

Assessment

Mathematics

The math assessment can be graded with the answer key. Mastery is achieved by 75% (3 out of 4 are plotted correctly AND the country’s name is labeled).

The geography assessment can be graded with the suggested answers on the answer key or any reasonable answer. Mastery will be 3 good answers.

Extensions

Have students research what happens when plates collide beside natural disasters.

Lots of YouTube videos:
Where Two Tectonic Plates Collide (3.19 min)
https://www.youtube.com/watch?v=tAR1tzooDaw

Plate Tectonics (7.08 min)
https://www.youtube.com/watch?v=RA2-Vc4PIOY

Collisional Plate Boundaries- diagram and explanation (1.27 min)
https://www.youtube.com/watch?v=i7ZUAi0B7DA

What Causes Earthquakes (4.49 min)
https://www.youtube.com/watch?v=FIgksa3x11w

How Earthquakes Happen (video for kids) (4.56 min)
https://www.youtube.com/watch?v=ROVuhDENYh0