Application: Plate Tectonics

Goals of This Exercise

• Use the features of an ocean and two continental margins to identify possible plate boundaries and their types
• Use the types of plate boundaries to predict the likelihood of earthquakes and volcanoes
• Determine the safest site for two cities, considering the earthquake and volcanic hazards
• Draw a cross section of your plate boundaries, showing the position of your plates at depth

A. Plate Boundaries of an Unknown Ocean and Continents

The perspective and map views below show two continents, labeled A and B, separated by an ocean. Use the features shown to identify possible plate boundaries and to propose whether each boundary is divergent, convergent, or transform. For transform boundaries, only mark transform faults (where motion is still occurring), not fracture zones (where it is not).

• On the map view at the bottom on the page, use colored pencils or pens to mark the location and type of each plate boundary on the map at the bottom of this page. Use the following colors: divergent = black; convergent = red; transform = blue.


B. Predicting the Location of Earthquakes and Volcanoes

After you draw your plate boundaries on the map, use the map to predict where earthquakes and volcanoes are likely. On the map view on the previous page, do the following:

1. Draw small circles \( \bullet \) in any place, on land or in the ocean, where you think earthquakes are likely. Draw larger circles \( \bigcirc \) for places where you expect large, destructive earthquakes.

2. Draw small triangles \( \triangle \) in any place where you think volcanic eruptions are likely, either on land or in the ocean. Draw larger triangles \( \bigtriangleup \) for places where you expect especially explosive and dangerous eruptions. Remember that not all volcanoes form directly on the plate boundary; some form off to one side.

3. Next, determine a safe place to build one city on each continent. Show each location with a large plus sign \( \oplus \) on the map. In the space below, explain your reasons for choosing these as the safest sites.

Reasons for Location of City on Continent A:

Reasons for Location of City on Continent B:

C. Showing the Plate Boundaries in Cross Section

On the figure below, draw a simple cross section of your plates in the subsurface. Consider the following:

- Draw the geometries of the plates at depth for spreading centers and subduction zones
- Show the variations in thickness of the crust and variations in thickness of the lithosphere
- Draw arrows to indicate which way the plates are moving relative to each other
- Show where melting is occurring at depth to form volcanoes on the surface

In your drawing, draw the plates with similar angles and thicknesses as in the textbook.