



Earth moves

from the Esri GeoInquiries™ collection for World Geography

Target audience – World geography learners

Time required – 15 minutes

Activity

Examine seismic and volcanic activity patterns around the world relative to tectonic plate boundaries, physical features on the earth's surface, and cities at risk.

World Geography Standards

C3:D2.Geo.1.6-8. Construct maps to represent and explain the spatial patterns of cultural and environmental characteristics.

Learning Outcomes

- Locate zones of significant seismic or volcanic activity.
- Describe the relationship between zones of high seismic or volcanic activity and tectonic plate boundaries.

Map URL: <http://esriurl.com/worldGeoInquiry3>

? Ask

Where are global earthquakes located?

- Click the link above to launch the map.
- Examine the yellow dots on the map that represent earthquakes with a magnitude of 5.7+.
- ? What patterns do you see on the map? *[Answers will vary. Many earthquakes occur on the western coast of North and South America, along the eastern coast of Asia, and along the islands of the Pacific Rim. The pattern follows the Ring of Fire. Earthquakes occur in the Atlantic and Indian Oceans.]*

! Acquire

Where are the largest earthquakes on Earth?

- With the Details button depressed, click the button, Show Contents.
- Click the Earthquakes Magnitude 5.7+ layer name, and then click the Show Table button.
- Each record in this table represents one point on the map.
- Click the Magnitude column heading (field) and choose Sort Descending.
- Highlight the first 20 records (highest magnitude earthquakes). (See the *Select Features in a Table* ToolTip on the next page for details.)
- ? Where are the blue highlighted high-magnitude earthquakes located on the map? *[Mostly in the Ring of Fire, Southeast Asia, and west coast of South America]*

🔍 Explore

Where are the active volcanoes on Earth?

- In the top-right corner of the table, click the X to close the table.
- In the Contents pane, uncheck the Earthquakes Magnitude 5.7+ layer box to turn off the layer, and then turn on the Volcanoes - Active Only layer.
- ? What patterns do you see in the volcano locations, and how do they compare with the earthquake patterns? *[The earthquake and volcano locations line up in similar patterns except for the volcanoes in some areas of Africa and the north Pacific Ocean.]*

Analyze

Where are tectonic plates relative to physical features on Earth?

- ? Based on the locations of earthquakes and volcanoes, where do you think the plate boundaries are? *[Answers may vary but should include that they follow the patterns of earthquakes and volcanoes.]*
- Earth is always changing. The crust of the earth includes several tectonic plates that are always on the move. The effects of movement are most noticeable at the boundaries between the plates.
- Turn off the Volcanoes - Active Only layer and turn on the Earth's Tectonic Plates and Major Physical Features layers.
- ? Are there any areas where physical features, plate boundaries, and seismic and volcanic activities overlap? (Turn on earthquakes and volcanoes if needed.) *[Yes, in the eastern part of the map where the Philippine and Pacific plates meet, eastern Africa, the Mid-Atlantic Ridge, and the western coast of North and South America]*

Act

Where might there be higher-risk areas for seismic or volcanic activities

- Turn off all layers except Major Cities, Continents, Earthquakes, and Volcanoes - Active Only.
- Pan and zoom the map to find cities that are near to an earthquake or volcano.
- ? Name three cities and the area in which they are located. *[Answers will vary.]*

VIEW AND SORT A TABLE

- Tables are only available for certain map layers.
- In the Contents pane, pause your pointer over a layer and click the Show Table button that appears under the layer name.
- Click the field name and choose Sort Ascending or Sort Descending.

SELECT FEATURES IN A TABLE

- In the table, click a feature in the list to see it highlighted in the map.
- To select multiple features, press the Shift key and click each feature that you want to highlight.

Next Steps

DID YOU KNOW? ArcGIS Online is a mapping platform freely available to public, private, and home schools. A school subscription provides additional security, privacy, and content features. Learn more about ArcGIS Online and how to get a school subscription at <http://www.esri.com/schools>. THEN TRY THIS...

- Find major cities within 20 miles of an active volcano by creating buffers.
- Create a buffer for the Major Cities layer with a distance of 20 miles (0.612 credits).

TEXT REFERENCES

This GIS map has been cross-referenced to material in sections of chapters from these high school texts.

- *World Cultures and Geography* by McDougal Littell
- *My World Geography* by Pearson