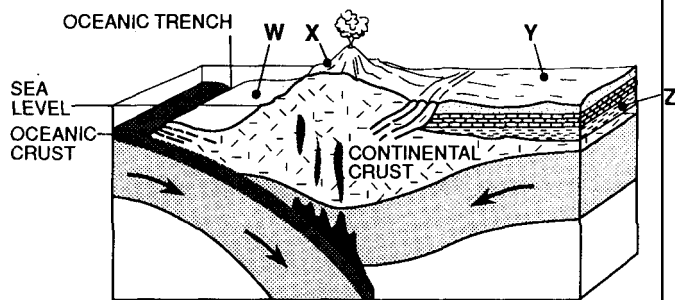


1. Which best describes a major characteristic of both volcanoes and earthquakes?
- (1) They are centered at the poles.
  - (2) They are located in the same geographic areas.
  - (3) They are related to the formation of glaciers.
  - (4) They are restricted to the Southern Hemisphere.
2. The diagram below represents a cross section of the Earth's crust at a location where an oceanic plate is converging (colliding) with a continental plate. The arrows indicate the direction of plate motion. Letters *W*, *X*, *Y*, and *Z* represent locations on the Earth.

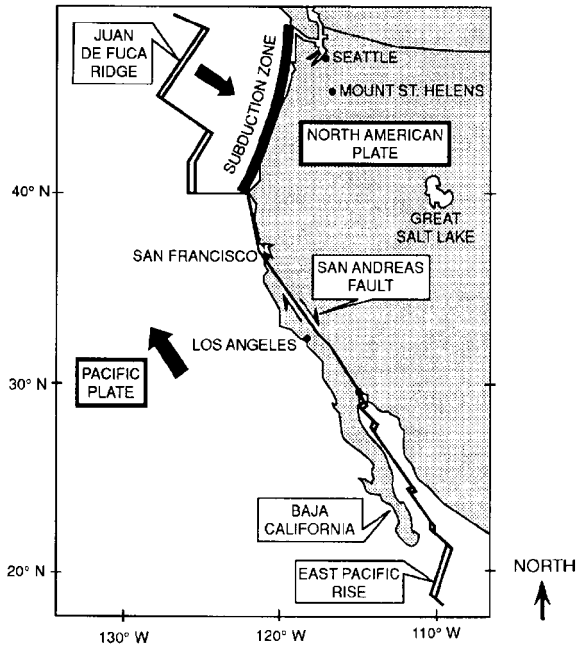


For an observer on the Earth's surface, the best evidence of this crustal plate collision would probably be provided by

- (1) seafloor fossils at location *W*
- (2) horizontal sedimentary layers at location *Z*
- (3) flooding near location *Y*
- (4) earthquakes and volcanic eruptions near location *X*

3. Recent volcanic activity in different parts of the world supports the inference that volcanoes are located mainly in
- (1) the centers of landscape regions
  - (2) zones in late stages of erosion
  - (3) zones of crustal activity
  - (4) the central regions of the continents
4. Where are earthquakes most likely to take place?
- (1) near a fault zone
  - (2) where the composition of the Earth tends to be uniform
  - (3) near the Earth's Equator
  - (4) along the core-mantle interface

Base your answers to questions 5 and 6 on the map below, which shows crustal plate boundaries located along the Pacific coastline of the United States. The arrows show the general directions in which some of the plates appear to be moving slowly.



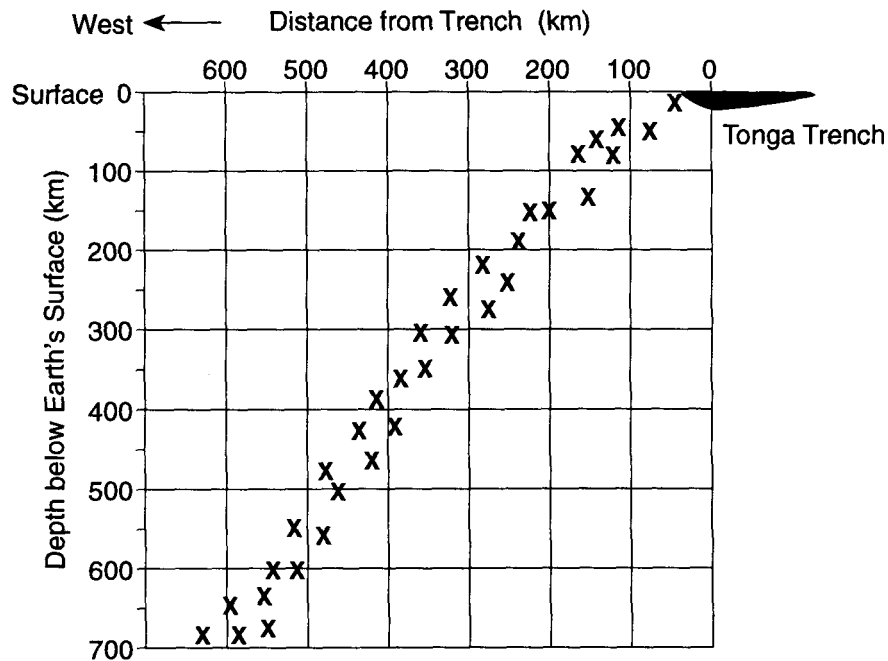
5. Which features are most often found at crustal plate boundaries like those shown on the map?

- (1) faulted bedrock and volcanoes
- (2) geysers and glaciers
- (3) plains and plateaus
- (4) meandering rivers and warm-water lakes

6. Geologic studies of the San Andreas fault indicate that

- (1) many earthquakes occur along the San Andreas fault
- (2) the North American plate and the Pacific plate are locked in dynamic equilibrium
- (3) the subduction zone is the boundary at which the crustal plates are drifting apart
- (4) the age of the bedrock increases as distance from the fault increases

Base your answers to questions 7 through 9 on the cross section of a portion of Earth's interior below. The cross section shows the focal depth of some earthquakes that occurred west of the Tonga Trench. Data were collected along the 22° S parallel of latitude.



7. The Tonga Trench is the crustal surface boundary between two tectonic plates. State the names of the two plates.
8. State the relationship between the depth of an earthquake's focus and the earthquake's distance from the Tonga Trench.
9. The focal depth pattern shown on the cross section represents the location of the subsurface boundary between the two tectonic plates. Describe the relative motion of the plates along this boundary.

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10. Base your answer to the following question on the passage and map below. The passage provides some information about the sediments under Portland, Oregon, and the map shows where Portland is located.

### **Bad seismic combination under Portland: Earthquake faults and jiggly sediment**

Using a technique called seismic profiling, researchers have found evidence of ancient earthquake faults under Portland, Oregon. The faults may still be active, a USGS [United States Geological Survey] seismologist will announce tomorrow.

The research also turned up a 250-foot deep layer of silt and mud, deep under the city, which may have been caused by a catastrophic ice dam break some 15,000 years ago.

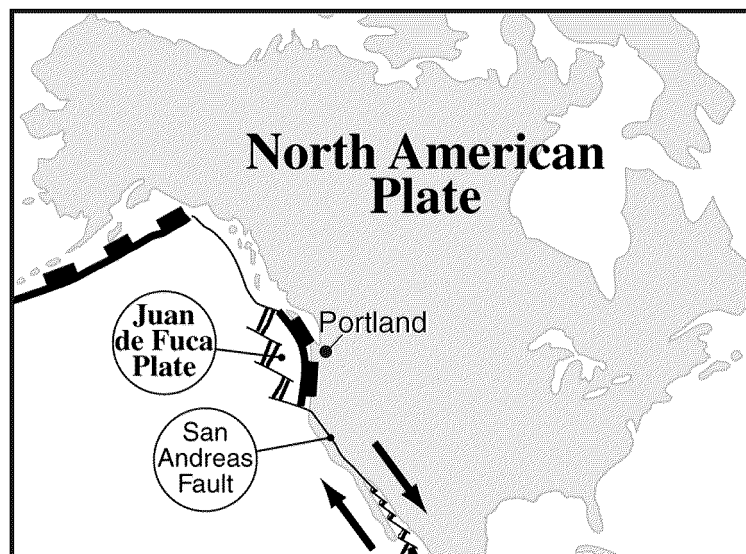
The two findings could together mean bad news, as soft sediment is known to amplify ground shaking during strong earthquakes. In the 1989 San Francisco earthquake, much the damage to buildings was caused by liquefaction, a shaking and sinking of sandy, watersaturated soil along waterways....

— Robert Roy Britt

excerpted from

“Bad seismic combination under Portland:  
Earthquake faults and jiggly sediment”

explorezone.com 05/03/99



Explain why Portland is likely to experience a major earthquake.

## Answer Key

1. 2

2. 4

3. 3

4. 1

5. 1

6. 1

7. Australian and Pacific.

(Note: Australian plate is also known as the Indian plate or the Indo-Australian plate).

8. *Examples:* – As distance increases, depth increases  
– The relationship is direct.

9. *Examples:* – The plates are converging. – One plate is sliding under the other.

10. Examples:

– Tectonic plates are shifting in this region.

– The ancient faults detected under Portland may still be active.

– Soft sediment causes minor earthquakes to become major earthquakes.

– Portland is located near a plate boundary.