



Regents Questions: Plate Tectonics



Name: _____ Date: _____ Period: _____

Due Date: _____

August 2012

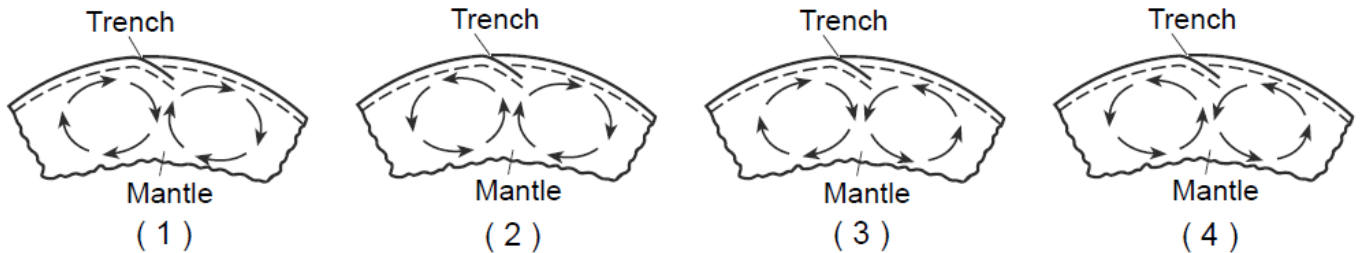
14 What is the approximate time difference between the first *P*-wave and the first *S*-wave recorded at a seismic station located 8000 kilometers from an earthquake's epicenter?

- (1) 8 minutes 40 seconds
- (2) 9 minutes 20 seconds
- (3) 11 minutes 20 seconds
- (4) 20 minutes 40 seconds

16 Which surface feature was produced by crustal movements at a transform plate boundary?

- (1) East African Rift
- (2) Aleutian Trench
- (3) Tasman Hot Spot
- (4) San Andreas Fault

34 Which cross section best represents the convection currents in the mantle beneath the Peru-Chile Trench?



41 On which tectonic plate is Puerto Rico located?

- (1) North American Plate
- (2) South American Plate
- (3) Caribbean Plate
- (4) Cocos Plate

60 Explain why the age of the ocean-floor bedrock increases as the distance from the Mid-Atlantic Ridge increases. [1]

61 The Mid-Atlantic Ridge separates pairs of crustal plates, such as the South American Plate and the African Plate. Identify *one other pair* of crustal plates separated by the Mid-Atlantic Ridge. [1]

_____ and _____

June 2012

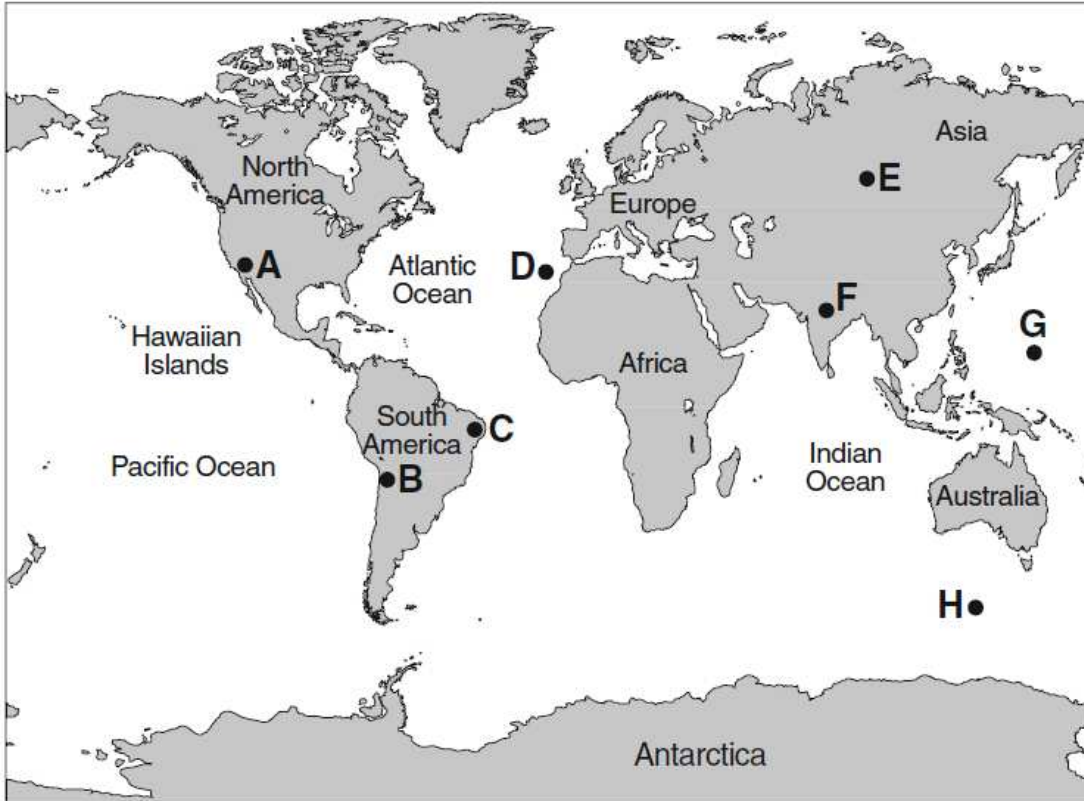
17 A model of Earth's internal structure is shown below. Analysis of which type of data led to the development of this model?

- (1) seismic waves
- (2) depth of Earth's oceans
- (3) electromagnetic radiation
- (4) isobar gradients

31 An earthquake occurs at 12:02 p.m. A seismic station records the first *S*-wave at 12:19 p.m. Which set of data shows the approximate arrival time of the first *P*-wave and the distance to the epicenter?

- (1) 12:11:25 p.m. and 4000 km (3) 12:19:40 p.m. and 4000 km
(2) 12:11:25 p.m. and 6000 km (4) 12:19:40 p.m. and 6000 km

Base your answers to questions 66 and 67 on the world map below. Points *A* through *H* represent locations on Earth's surface.



66 Identify the *two* lettered locations from the map that are *least* likely to experience volcanic activity or earthquakes. [1]

67 Identify the tectonic feature responsible for the formation of the Hawaiian Islands. [1]

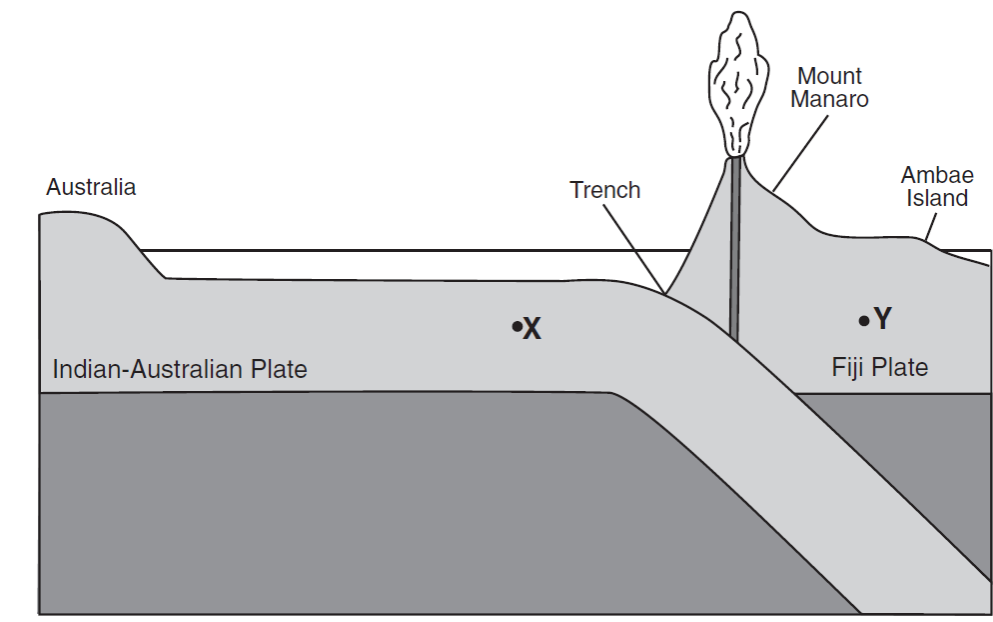
Mount Manaro Erupts!

Mount Manaro is a volcano on Ambae Island, about 1400 miles northeast of Australia. Ambae Island is located in the South Pacific Ocean at 15° south latitude, 168° east longitude. After Mount Manaro had erupted in 1995, Ambae Island residents developed an evacuation plan. When Mount Manaro began erupting gas, steam, and ash on November 27, 2005, scientists and residents watched the volcano carefully. The eruption became more severe on December 9, 2005, when steam and gases rose 1.8 miles up into the air. Rocks and ash began to fall on nearby farms and homes. Thousands of people left their homes, making it the largest evacuation ever on Ambae Island.

83 Name the highest layer of the atmosphere into which the steam from the volcanic eruption rose on December 9, 2005. [1]

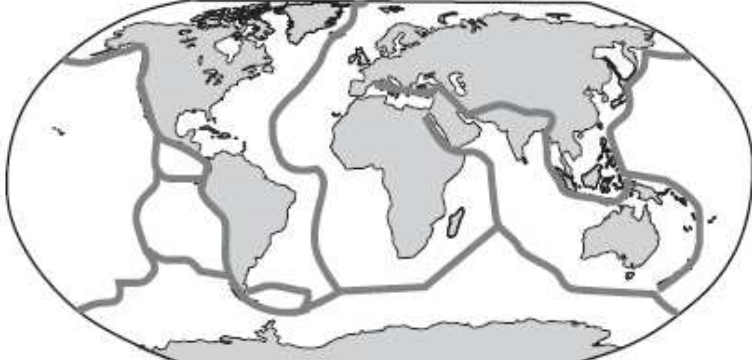
84 Identify the ocean current off the northeast coast of Australia that most affects the climate of Ambae Island. [1]

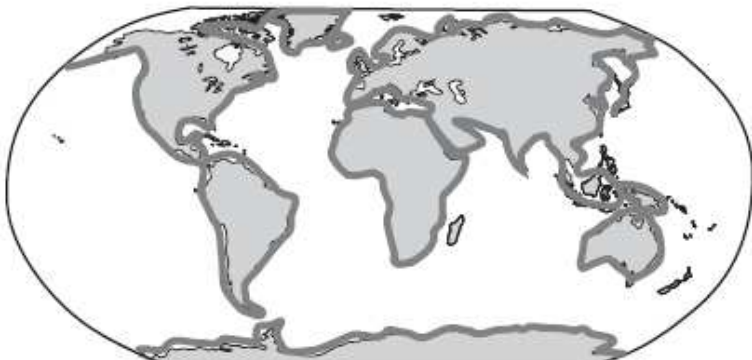
85 On the diagram *below*, draw *one* arrow through point *X* and *one* arrow through point *Y* to indicate the direction of tectonic plate motion near Mount Manaro. [1]

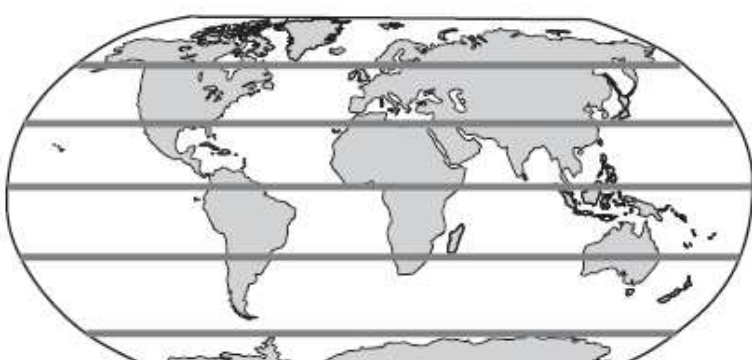


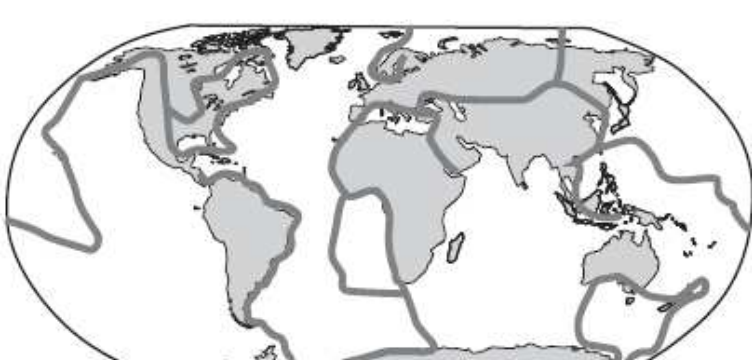
January 2012


30 Which world map shows the locations where most earthquakes and volcanoes occur on Earth?

(1) 

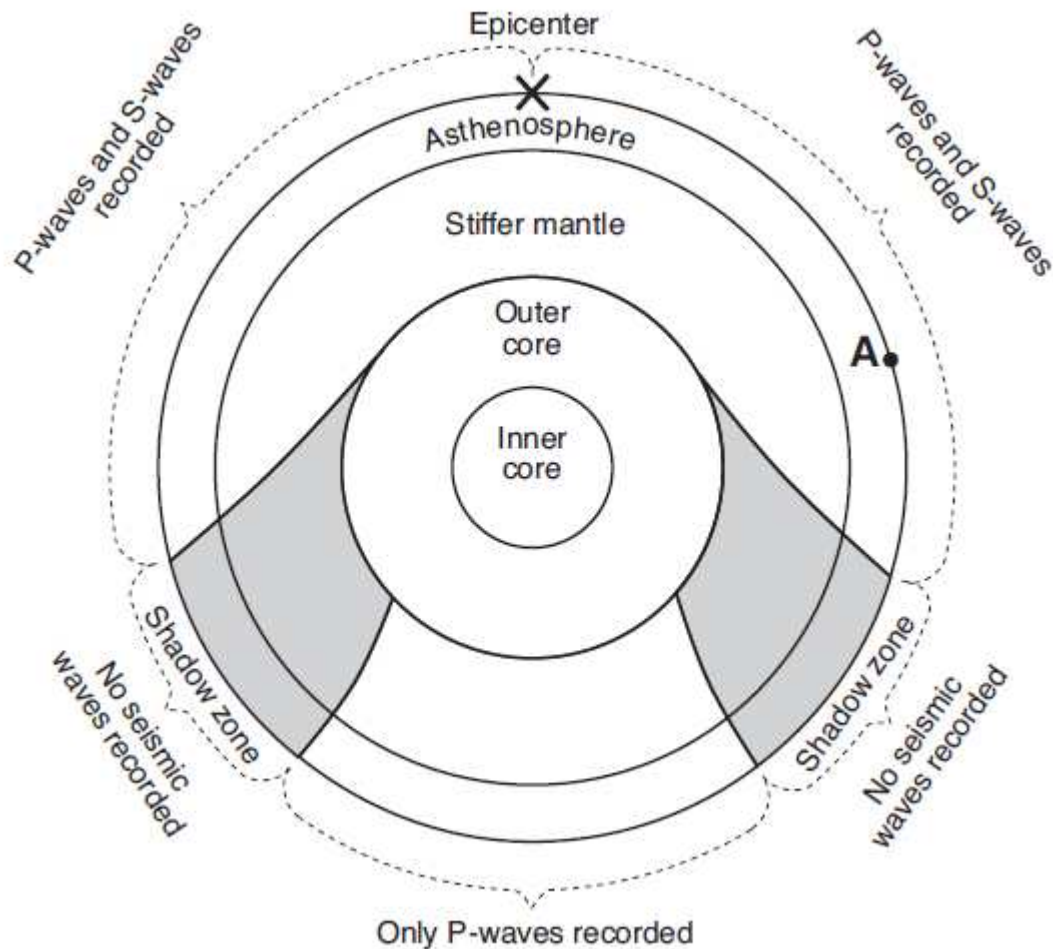
(2) 

(3) 

(4) 

Key	
	Location of most earthquakes and volcanoes

Base your answers to questions 36 and 37 on the cross section below, which shows the type of seismic waves recorded at various locations after an earthquake has occurred. Point A is a location on Earth's surface and X is the epicenter of the earthquake.



36 Point A is located 7600 kilometers from the epicenter of this earthquake. How many minutes did it take the first S-wave to reach point A?

- (1) 9 min (2) 11 min (3) 16 min (4) 20 min

37 How many kilometers did the seismic waves travel from the earthquake directly to the outside of the outer core?

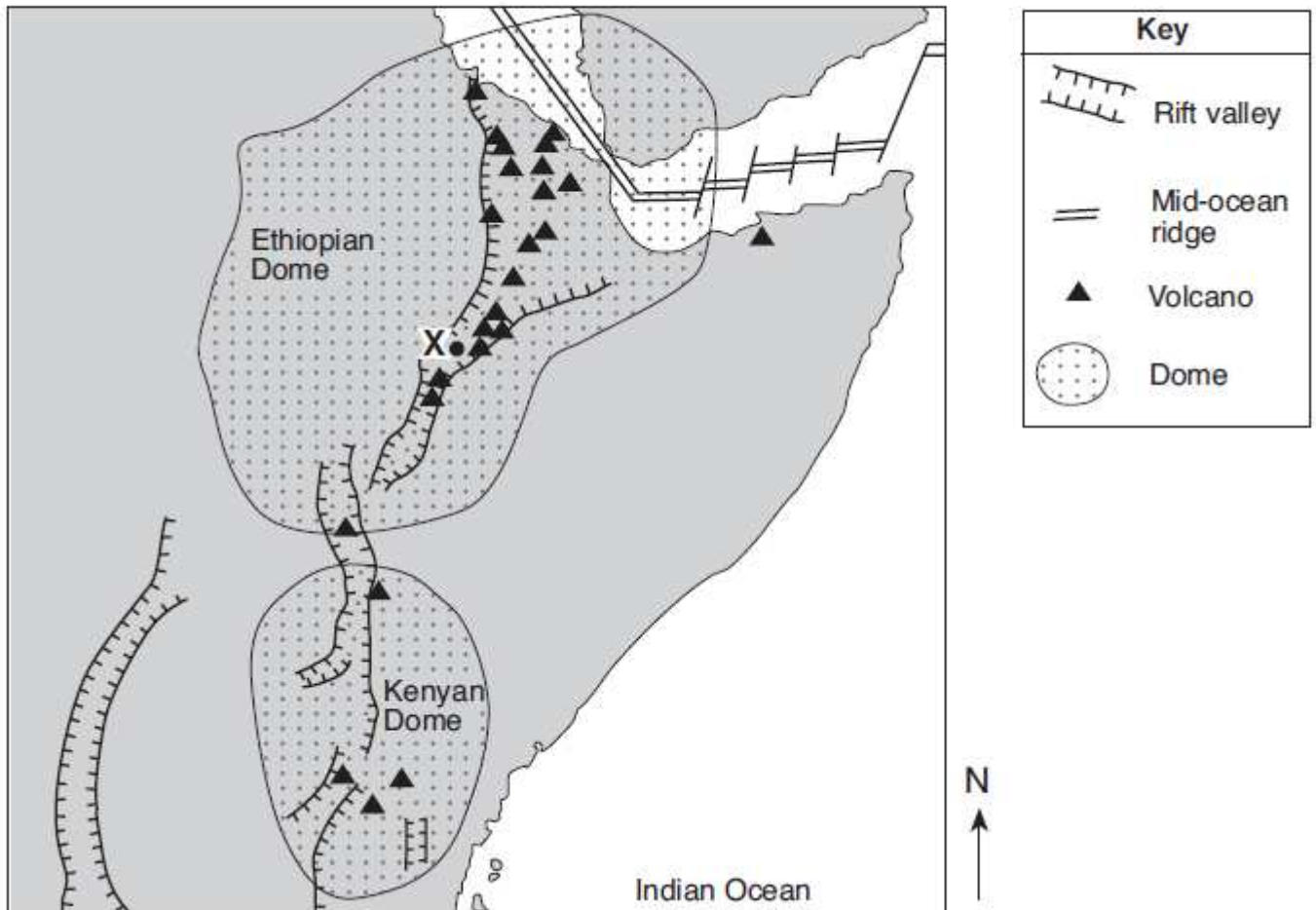
- (1) 800 km (2) 1400 km (3) 2900 km (4) 6400 km

Base your answers to questions 60 through 62 on the passage and map of a portion of the East African Rift system shown below. Point X represents a location on Earth's surface within a rift valley on the Ethiopian Dome.

The Great Rift Valley

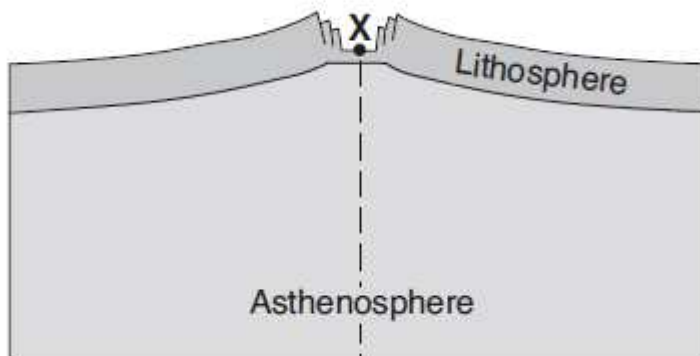
Rifting of Earth's crust in eastern Africa began during the Neogene Period as the Ethiopian and Kenyan Domes formed. These two huge domes were created as Earth's mantle pushed up the overlying crust. As the crust was forced upward, the resulting tension cracked the crust, resulting in the eruption of volcanoes and the formation of large rifts. The crust continued to pull apart, forming rift valleys. These valleys have become deeper and are currently becoming filled with sediments, igneous rock, and water.

East African Rift System



60 How many million years ago did the Ethiopian and Kenyan Domes form? [1]

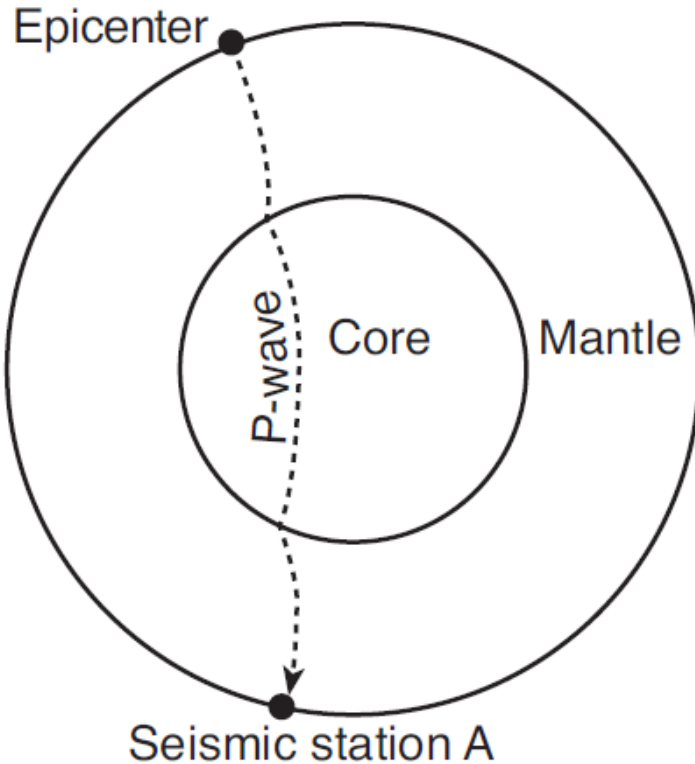
61 On the cross section *below*, draw *two* curved arrows, one on each side of the dashed line, to show the direction of movement of the convection currents within the asthenosphere that caused the formation of the dome and the rift valley near location X. [1]



62 Which *two* lithospheric plates are separated by a mid-ocean ridge in the northeastern portion of the Ethiopian Dome? [1]

August 2011

24 The cross section of Earth below shows a *P*-wave moving away from an earthquake epicenter to seismic station A.

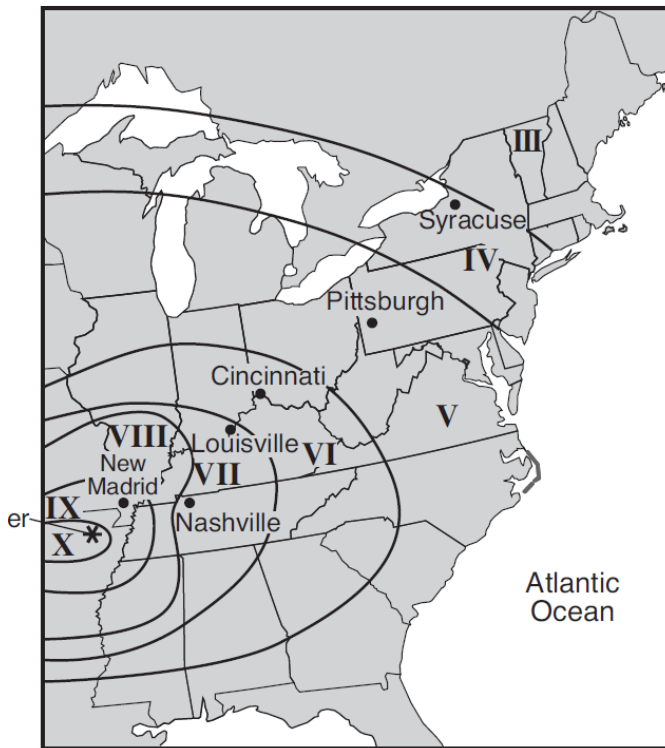


No *S*-waves arrive directly at seismic station A because

- (1) some parts of the core are liquid.
- (2) *S*-waves travel too slowly.
- (3) the distance to seismic station A is too great.
- (4) seismic station A is located on glacial ice.

Base your answers to questions 43 and 44 on the map and the modified Mercalli scale shown below. The map shows the intensities of the earthquake that occurred slightly southwest of New Madrid, Missouri, on December 16, 1811. The epicenter of this earthquake is represented by ✱. The Roman numerals on the map show zones of earthquake intensities determined by using the modified Mercalli scale.

**Earthquake Intensity
with Modified Mercalli Scale**



Modified Mercalli Intensity Scale

I:	Not felt except under unusual conditions
II:	Felt by only a few persons Suspended objects might swing
III:	Quite noticeable indoors
IV:	Dishes and windows rattle
V:	Felt by nearly everyone Some dishes and windows break
VI:	Furniture moves Some plaster falls
VII:	Everybody runs outdoors Some chimneys break
VIII:	Chimneys, smokestacks, and walls fall Heavy furniture is overturned
IX:	Buildings shift off foundations Ground cracks
X:	Most ordinary structures are destroyed Landslides are common
XI:	Few structures remain standing Bridges are destroyed Broad cracks form in the ground
XII:	Damage is total Objects are thrown upward into the air

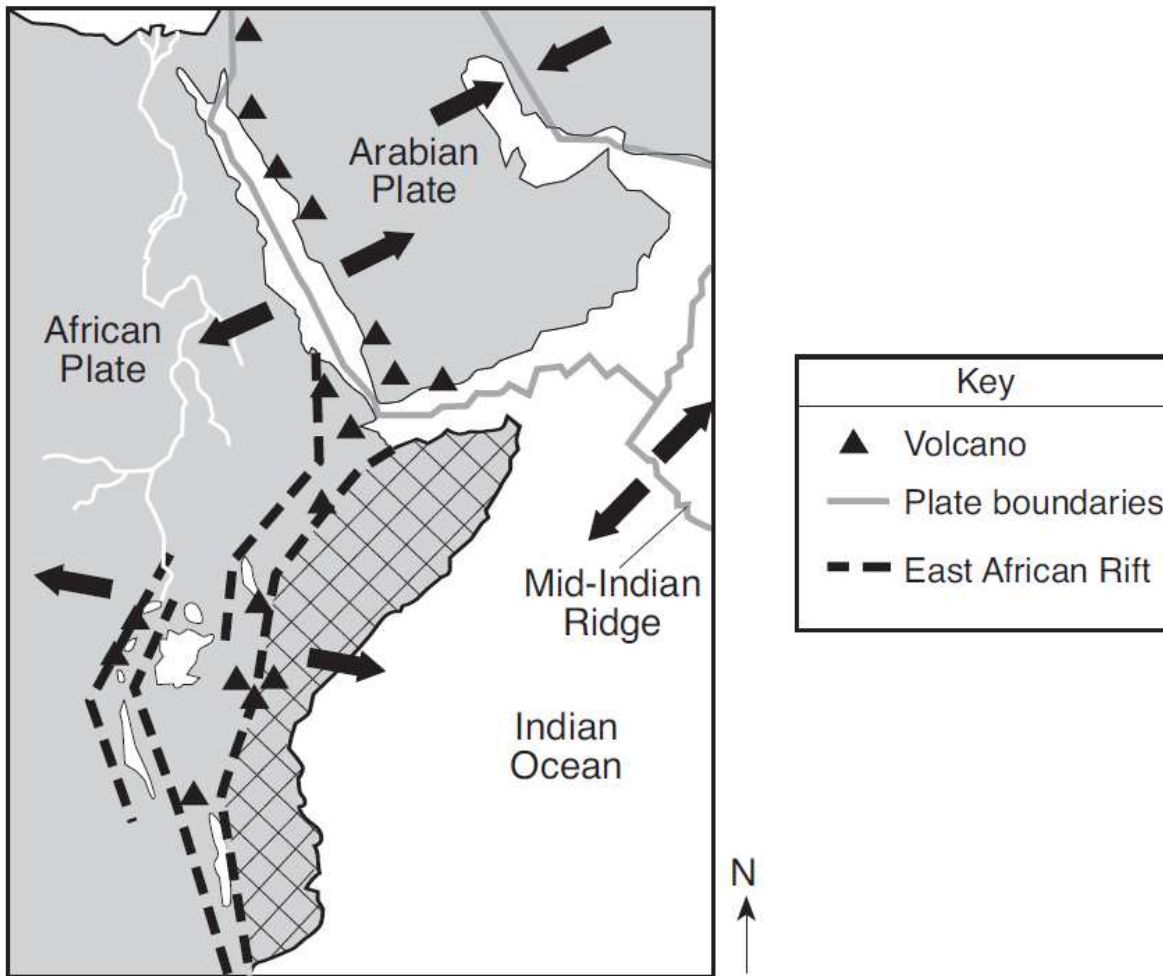
43 Which location would most probably have issued the report: “Many structures shifted off foundations”?
 (1) New Madrid (2) Syracuse (3) Pittsburgh (4) Nashville

44 The intensity numbers shown on the map were determined by
 (1) the arrival time of the first *P*-wave recorded at each city
 (2) the recorded time difference in the arrival of the first *P*-wave and *S*-wave at each city
 (3) observations made at different locations during and after the earthquake
 (4) observations made only at the earthquake epicenter

Base your answers to questions 45 and 46 on the map below, which shows the tectonic plate boundaries near the East African Rift.

Arrows show relative tectonic plate movement. A region of Africa is crosshatched: (X)

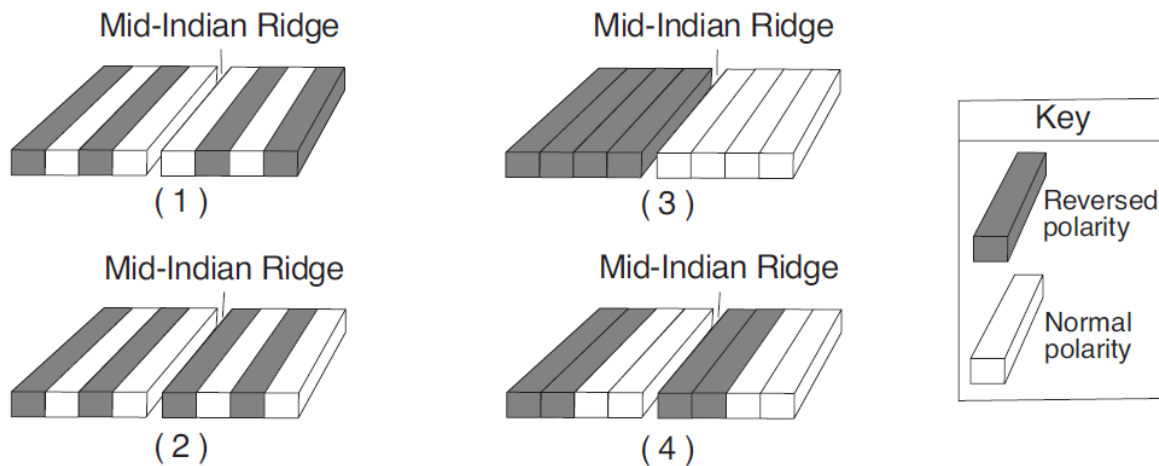
East African Rift Region



45 What appears to be happening to the crosshatched region of eastern Africa?

- (1) A folded mountain range is forming as this region collides with the rest of Africa.
- (2) Several volcanic mountains are forming as the rest of Africa subducts under this region.
- (3) This region is moving eastward relative to the rest of Africa.
- (4) This region is moving northward relative to the rest of Africa.

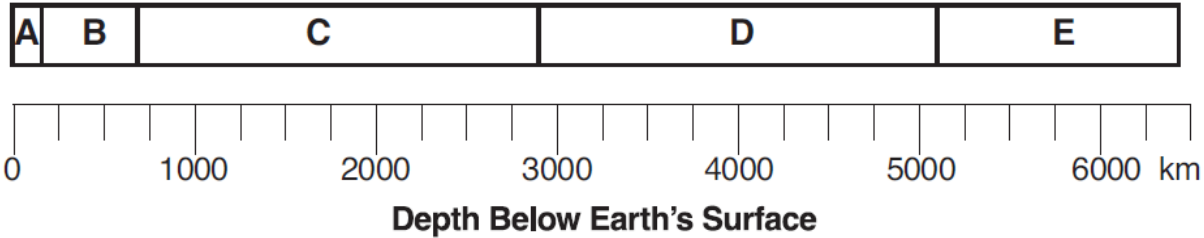
46 Which diagram best represents the polarity of the magnetic field preserved in the ocean-floor bedrock found on both sides of the Mid-Indian Ridge?



June 2011

Base your answers to questions 36 through 40 on the diagram below, which represents zones of Earth's interior, identified by letters *A* through *E*. The scale shows depths below Earth's surface, measured in kilometers.

Zones of Earth's Interior



36 The Moho is a boundary located in zone

- (1) *A* (2) *B* (3) *E* (4) *D*

37 What is the approximate thickness of zone *C*?

- (1) 650 km (2) 1600 km (3) 2250 km (4) 2900 km

38 Which zone is characterized by partially melted rock and large-scale convection currents?

- (1) zone *A* (2) zone *B* (3) zone *C* (4) zone *E*

*39 Which zone of Earth's interior has a density closest to the densities of the other terrestrial planets?

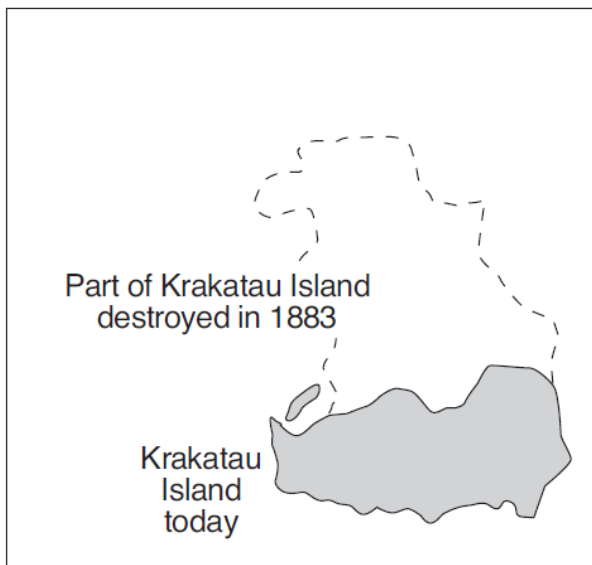
- (1) zone *A* (2) zone *E* (3) zone *C* (4) zone *D*

40 *S*-waves produced by an earthquake are transmitted through zones

- (1) *A* and *B*, but not zones *C*, *D*, and *E* (3) *C*, *D*, and *E*, but not zones *A* and *B*
(2) *A*, *B*, and *C*, but not zones *D* and *E* (4) *D* and *E*, but not zones *A*, *B*, and *C*

Base your answers to questions 80 through 85 on the passage and map below. The map shows the volcanic island, Krakatau, before and after the 1883 eruption.

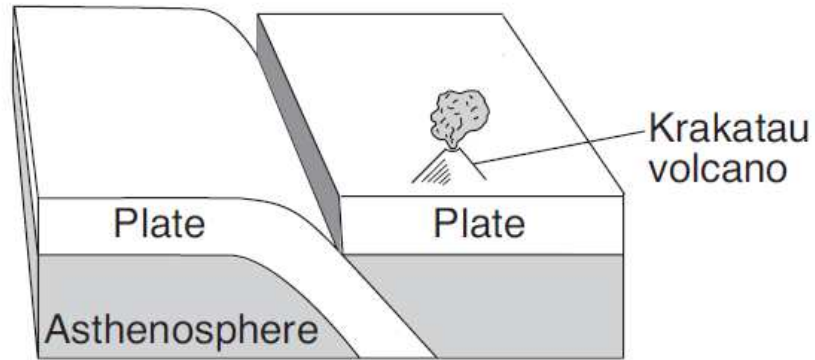
Volcanic Island of Krakatau



Krakatau

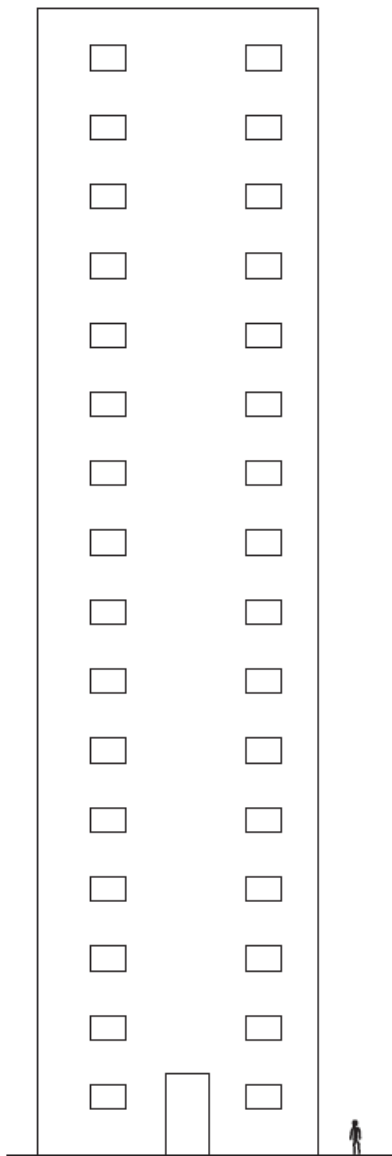
On August 27, 1883, one of the largest volcanic eruptions ever recorded in history occurred. Krakatau, a volcanic island nearly 800 meters in height, located at 6° S 105.5° E, exploded. Two-thirds of the island was destroyed by the blast. Blocks of pumice produced by the eruption were found floating in the ocean for months afterward. Tsunamis produced by the eruption reached heights of 40 meters as they came ashore on nearby islands. These destructive waves traveled 6360 kilometers in just 12 hours. Over 36,000 people died and 165 coastal villages were destroyed. Volcanic ash was blasted into the atmosphere to heights between 36 and 48 kilometers. Global temperatures cooled as the ash traveled on air currents around the world.

80 The diagram *below* shows where Krakatau formed, then exploded. Draw *one* arrow on *each* lithospheric plate to show the relative direction that both plates are moving to produce this type of volcano. [1]



(Not drawn to scale)

The diagram *below* represents an average size person standing next to a tall building.



81 Draw a horizontal line across the building to show the maximum height of the tsunami waves produced by the 1883 eruption of Krakatau. [1]

82 Determine the rate the tsunamis traveled across the ocean. Label your answer with the correct units. [1]

83 Identify the layer of the atmosphere into which the highest volcanic ash was blasted from the Krakatau eruption. [1]

84 Explain how the volcanic ash from the Krakatau eruption caused global temperatures to decrease. [1]

Scale: 1 centimeter = 5 meters

January 2011

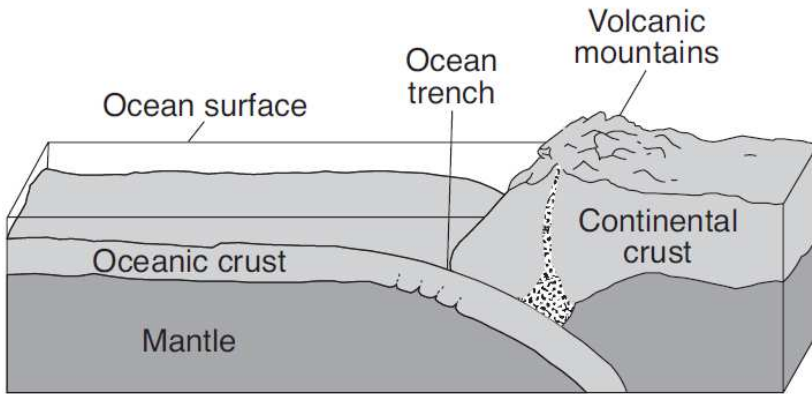
21 The Indian-Australian tectonic plate is moving

- (1) away from the Philippine Plate
- (2) away from the Fiji Plate
- (3) toward the Pacific Plate
- (4) toward the Antarctic Plate

22 The inferred temperature at the interface between the stiffer mantle and the asthenosphere is closest to

- (1) 1000°C
- (2) 2500°C
- (3) 4500°C
- (4) 5000°C

32 The block diagram below shows the boundary between two tectonic plates.



(Not drawn to scale)

Which type of plate boundary is shown?

- (1) divergent
- (2) convergent
- (3) transform
- (4) complex

Base your answers to questions 43 through 45 on the data table below, which gives information collected at seismic stations W, X, Y, and Z for the same earthquake. Some of the data have been omitted.

Data Table

Seismic Station	P-Wave Arrival Time (h:min:s)	S-Wave Arrival Time (h:min:s)	Difference in Arrival Times (h:min:s)	Distance to Epicenter (km)
W	10:50:00	no S-waves arrived		
X	10:42:00	10:46:40		
Y	10:39:20		00:02:40	
Z	10:45:40			6200

43 Which seismic station was farthest from the earthquake epicenter?

- (1) W
- (2) X
- (3) Y
- (4) Z

44 What is the most probable reason for the absence of S-waves at station W?

- (1) S-waves were not generated at the epicenter.
- (2) S-waves cannot travel through liquids.
- (3) Station W was located on solid bedrock.
- (4) Station W was located on an island.

45 At what time did the S-wave arrive at station Y?

- (1) 10:36:40
- (2) 10:39:20
- (3) 10:42:00
- (4) 10:45:20