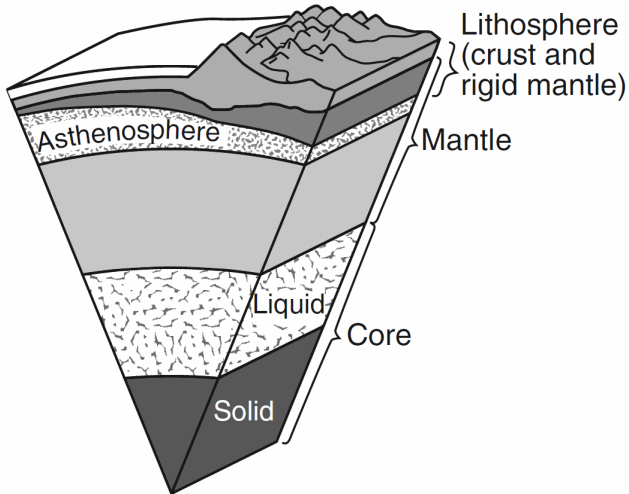

1. Which two Earth layers are separated by the Moho boundary?

- A) rigid mantle and plastic mantle
- B) outer core and stiffer mantle
- C) stiffer mantle and asthenosphere
- D) crust and rigid mantle

2. A model of Earth's internal structure is shown below.

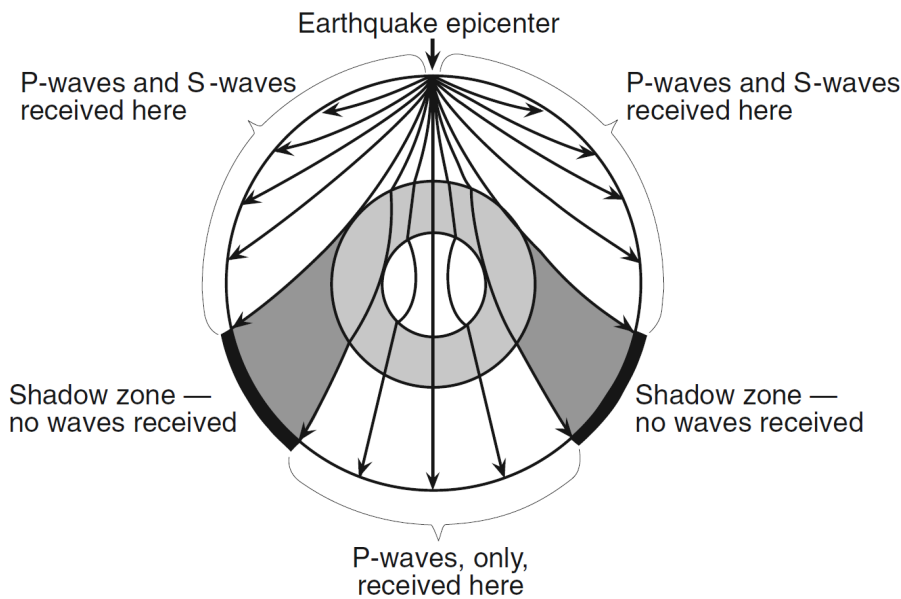


(Not drawn to scale)

Analysis of which type of data led to the development of this model?

- A) seismic waves
 - B) depth of Earth's oceans
 - C) electromagnetic radiation
 - D) isobar gradients
-

3. Base your answer to the following question on the cross section below, which shows the paths of seismic waves traveling from an earthquake epicenter through the different layers of Earth's interior.



No *P*-waves or *S*-waves are received in the shadow zone because

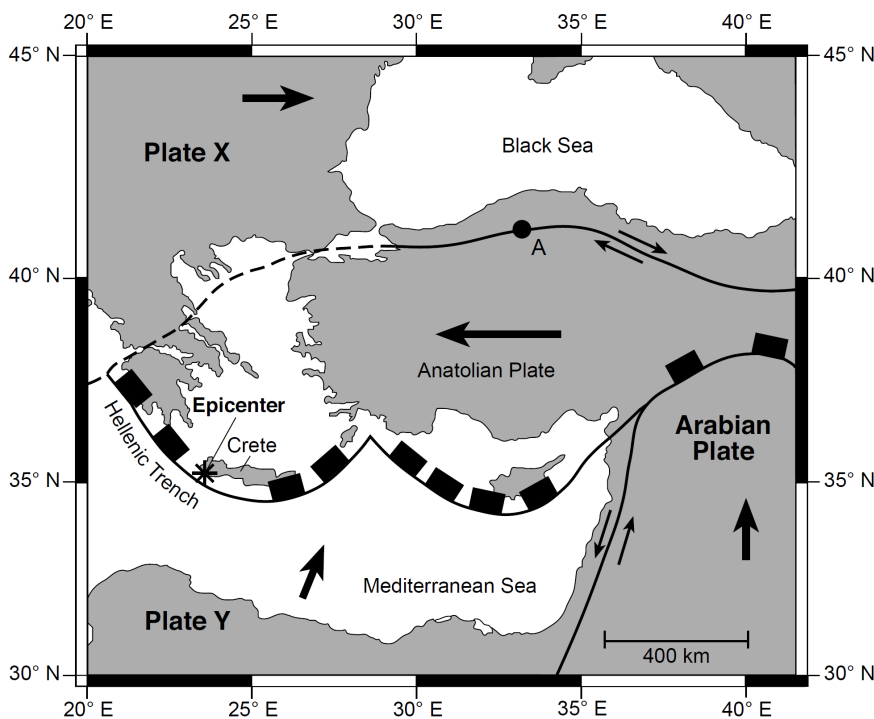
- A) *P*-waves are absorbed and *S*-waves are refracted by Earth's outer core
 B) *P*-waves are refracted and *S*-waves are absorbed by Earth's outer core
 C) both the *P*-waves and *S*-waves are refracted by Earth's outer core
 D) both the *P*-waves and *S*-waves are absorbed by Earth's outer core
-
4. Which part of Earth's interior is inferred to have convection currents that cause tectonic plates to move?
 A) rigid mantle B) asthenosphere
 C) outer core D) inner core
5. Earth's outer core is best inferred to be
 A) liquid, with an average density of approximately 4 g/cm³
 B) liquid, with an average density of approximately 11 g/cm³
 C) solid, with an average density of approximately 4 g/cm³
 D) solid, with an average density of approximately 11 g/cm³
6. Why is Earth's outer core inferred to be a liquid?
 A) *P*-waves can pass through the outer core.
 B) *P*-waves cannot pass through the outer core.
 C) *S*-waves can pass through the outer core.
 D) *S*-waves cannot pass through the outer core.
7. The rock between 2,900 kilometers and 5,200 kilometers below the Earth's surface is inferred to be
 A) an iron-rich solid
 B) an iron-rich liquid
 C) a silicate-rich solid
 D) a silicate-rich liquid
8. Compared to the oceanic crust, the continental crust is usually
 A) thicker, with a less dense granitic composition
 B) thicker, with a more dense basaltic composition
 C) thinner, with a less dense granitic composition
 D) thinner, with a more dense basaltic composition
9. Beneath which surface location is Earth's crust the thinnest?
 A) East Pacific Ridge
 B) the center of South America
 C) Old Forge, New York
 D) San Andreas Fault

-
10. Which pair of elements makes up most of Earth's crust by volume?
- A) nitrogen and potassium
 - B) oxygen and silicon
 - C) hydrogen and oxygen
 - D) potassium and oxygen
11. The basaltic bedrock of the oceanic crust is classified as
- A) felsic, with a density of 2.7 g/cm^3
 - B) felsic, with a density of 3.0 g/cm^3
 - C) mafic, with a density of 2.7 g/cm^3
 - D) mafic, with a density of 3.0 g/cm^3
12. What are the inferred pressure and interior temperature at the boundary between Earth's outer core and inner core?
- A) 3.1 million atmospheres pressure and an interior temperature of 6300°C
 - B) 3.1 million atmospheres pressure and an interior temperature of 6700°C
 - C) 3.6 million atmospheres pressure and an interior temperature of 6300°C
 - D) 3.6 million atmospheres pressure and an interior temperature of 6700°C
13. The inferred temperature at the interface between the stiffer mantle and the asthenosphere is closest to
- A) 1000°C
 - B) 2500°C
 - C) 4500°C
 - D) 5000°C
14. What happens to the density and temperature of rock within Earth's interior as depth increases?
- A) density decreases and temperature decreases
 - B) density decreases and temperature increases
 - C) density increases and temperature increases
 - D) density increases and temperature decreases
15. In which part of the Earth is a rock temperature of $2,000^\circ\text{C}$ most likely to occur?
- A) continental crust
 - B) asthenosphere (plastic mantle)
 - C) stiffer mantle
 - D) outer core
16. Earth's inner core is inferred to be solid based on the analysis of
- A) seismic waves
 - B) crustal rocks
 - C) radioactive decay rates
 - D) magnetic pole reversals
17. Which type of tectonic plate boundary is found between the South American Plate and the Scotia Plate?
- A) transform
 - B) convergent
 - C) divergent
 - D) complex or uncertain
-

18. Base your answer to the following question on the passage and map below and on your knowledge of Earth science. The map shows the location of the epicenter of a major earthquake that occurred about 1700 years ago. Point *A* represents a location on a tectonic plate boundary. Plates *X* and *Y* represent major tectonic plates. The island of Crete; the Anatolian Plate, which is a minor tectonic plate; and the Hellenic Trench have been labeled. Arrows indicate the relative directions of plate motion.

Crete Earthquake

Scientists have located the geological fault, off the coast of Crete in the Mediterranean Sea, that likely shifted, causing a huge earthquake in the year 365 that devastated life and property on Crete. The southwestern coastal region of Crete was uplifted, as evidenced by remains of corals and other sea life now found on land 10 meters above sea level. Scientists measured the age of these corals to verify when this event occurred. This earthquake caused a tsunami that devastated the southern and eastern coasts of the Mediterranean Sea. It is estimated that earthquakes along the fault, associated with the Hellenic Trench, may occur about every 800 years.



Which type of plate boundary is represented at point *A*?

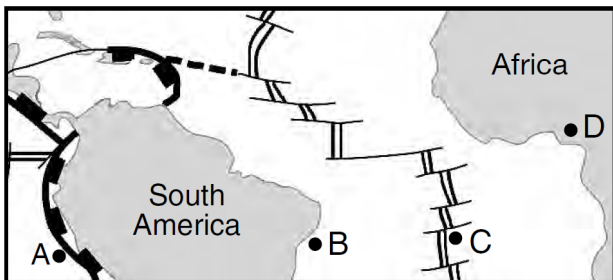
- A) divergent B) convergent C) transform D) complex

19. The map below shows California and a section of the San Andreas Fault.



What is the primary geologic process occurring along the San Andreas Fault?

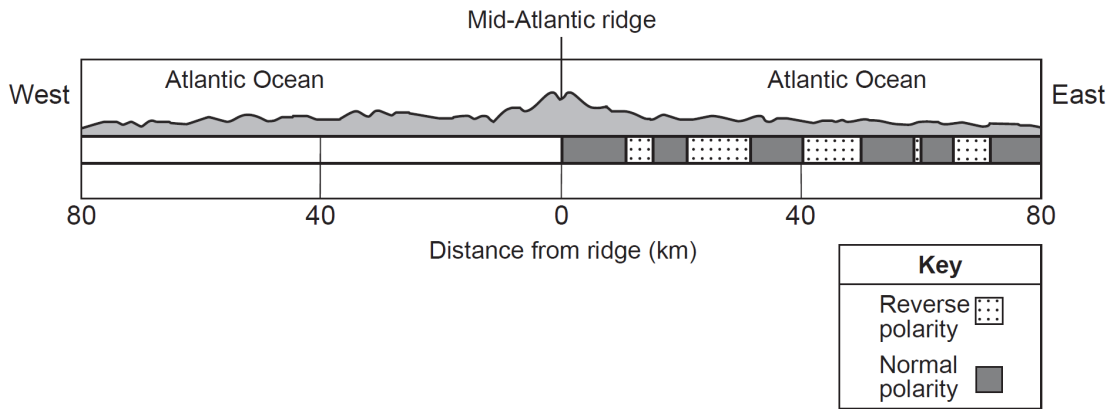
- A) transform movement
 - B) spreading movement
 - C) subduction
 - D) convergence
20. The formation of the Canary Islands was primarily caused by their location near a
- A) subduction zone
 - B) mantle hot spot
 - C) divergent boundary
 - D) transform fault
21. The map below shows some tectonic plate boundaries near South America and Africa. Letters *A*, *B*, *C*, and *D* represent locations on Earth's surface.



Which location most likely has the youngest bedrock?

- A) *A*
- B) *B*
- C) *C*
- D) *D*

22. The cross section below represents a pattern of magnetic field reversals preserved in the igneous bedrock of the oceanic crust east of the Mid-Atlantic ridge.



Which cross section best represents the magnetic field pattern west of the Mid-Atlantic ridge?

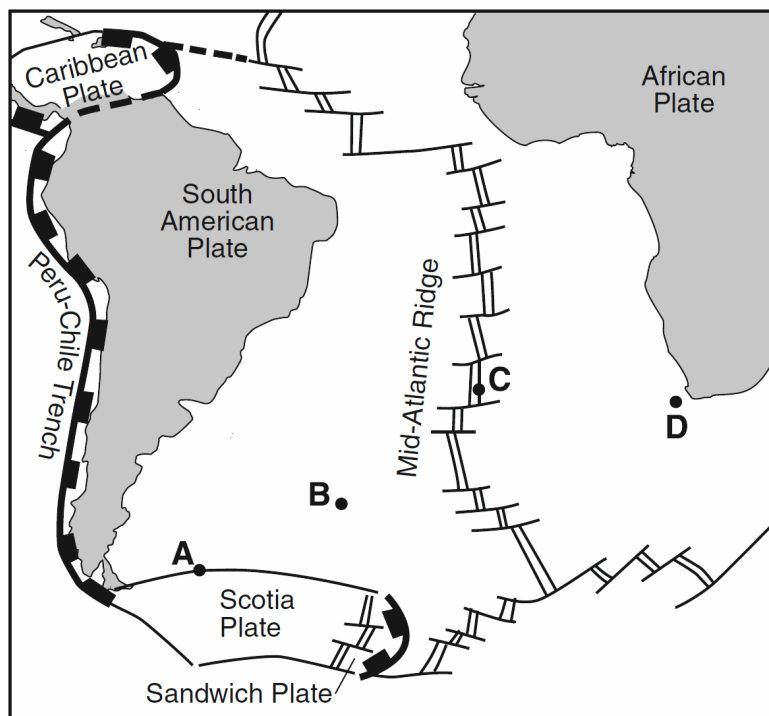
- A)
- B)
- C)
- D)

Base your answers to questions 23 through 25 on the passage below.

Crustal Activity at Mid-Ocean Ridges

Mid-ocean ridges are found at one type of tectonic plate boundary. These ridges consist of extensive underwater mountain ranges split by rift valleys. The rift valleys mark places where two crustal plates are pulling apart, widening the ocean basins, and allowing magma from the asthenosphere to move upward. In some cases, mid-ocean ridges have migrated toward nearby mantle hot spots. This explains why mid-ocean ridges and mantle hot spots are found together at several locations.

23. The map below shows a part of Earth's surface. Points *A* through *D* are locations on the ocean floor.



At which location is the temperature of the ocean floor bedrock most likely highest?

- A) *A* B) *B* C) *C* D) *D*

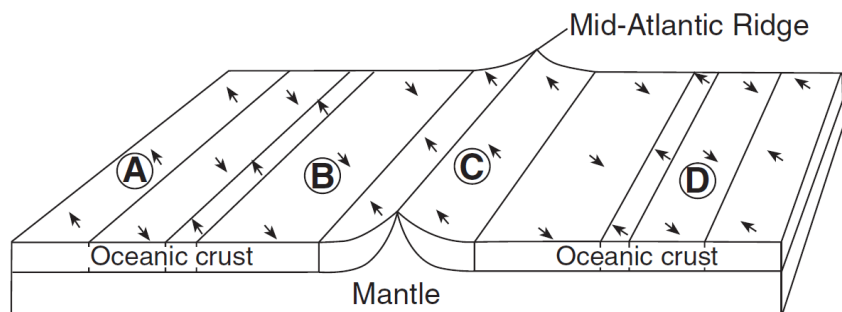
24. Which mantle hot spot is located closest to a mid-ocean ridge?

- A) Canary Islands B) Easter Island C) Hawaii D) Tasman

25. Which type of tectonic plate boundary is located at mid-ocean ridges?

- A) convergent B) transform C) divergent D) complex

26. The diagram below shows the magnetic polarity preserved by minerals within the bedrock of the oceanic crust near the Mid-Atlantic Ridge. Letters *A*, *B*, *C*, and *D* represent locations in the ocean-floor bedrock.

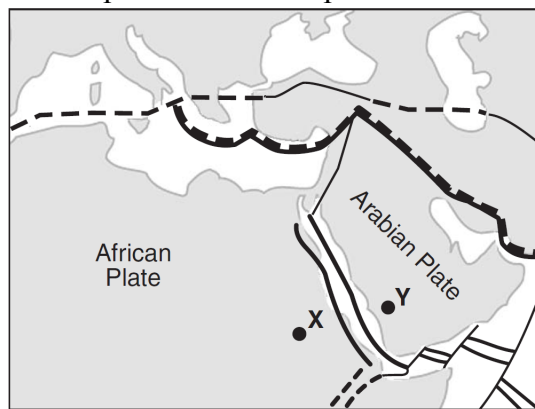


Key	
Magnetic Polarity of the Bedrock	
↗ Normal	↘ Reversed

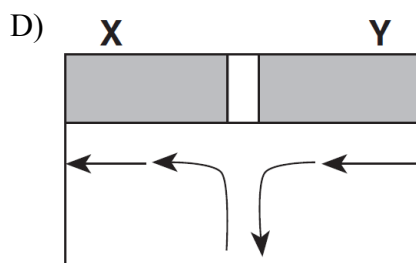
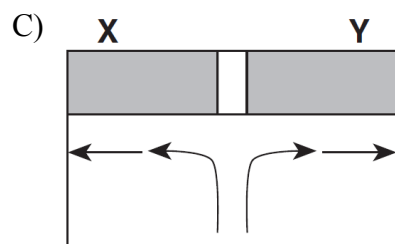
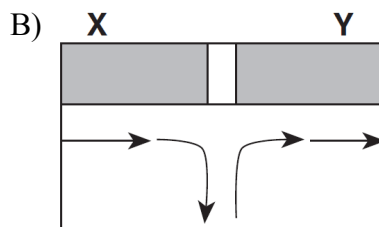
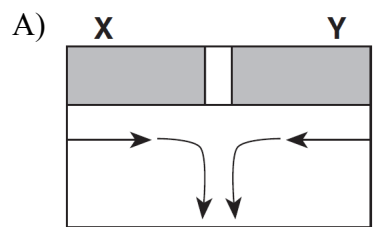
The most recently formed bedrock is found at location

- A) *A* B) *B* C) *C* D) *D*

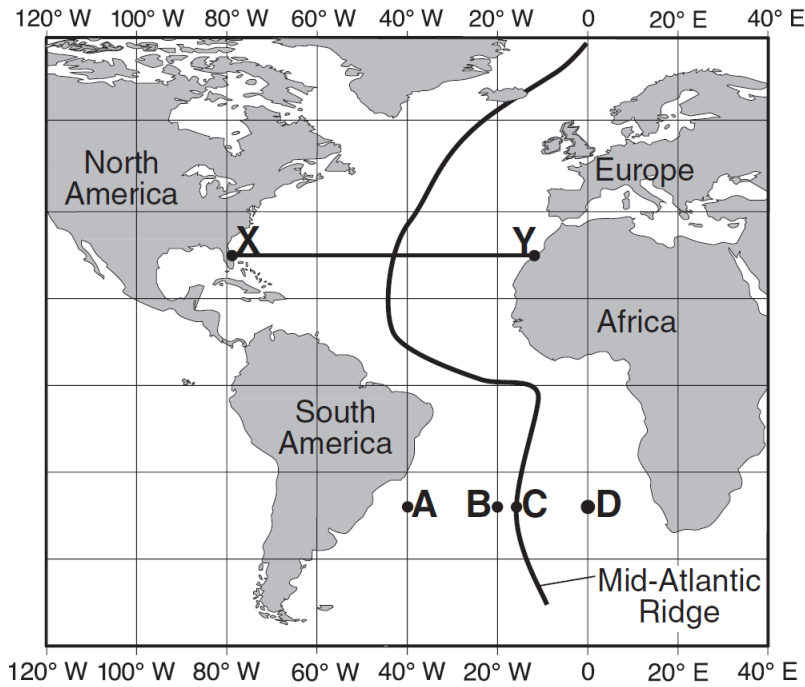
27. The map below shows a portion of Earth's surface. Points *X* and *Y* are locations on the lithosphere.



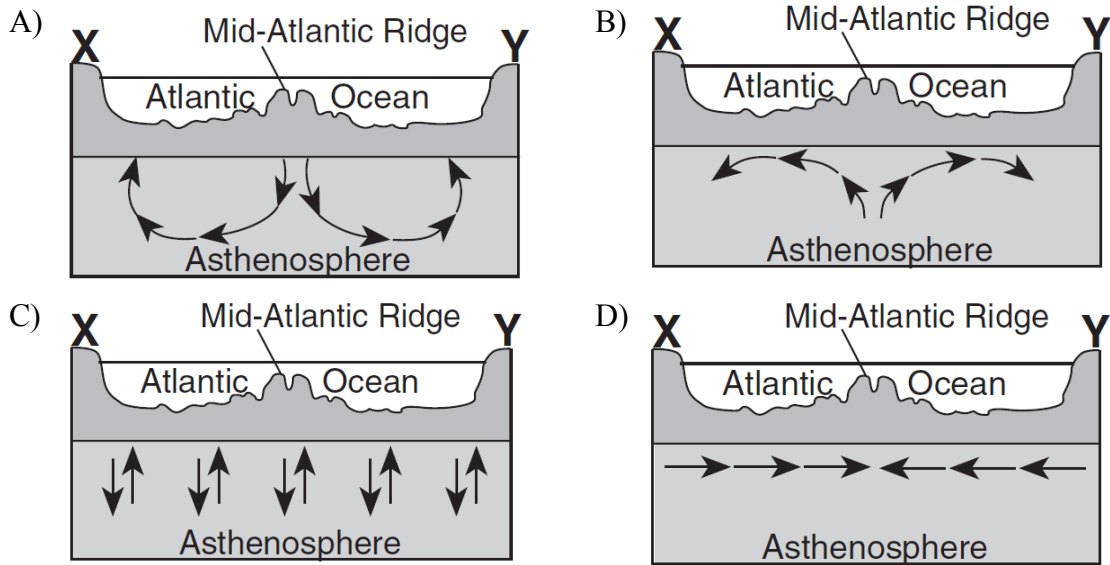
Which cross section shows the inferred movement of material in the asthenosphere beneath points *X* and *Y*?



28. Base your answer to the following question on the map of the Mid-Atlantic Ridge shown below. Points *A* through *D* are locations on the ocean floor. Line *XY* connects locations in North America and Africa.



In which cross section do the arrows best show the convection occurring within the asthenosphere beneath line *XY*?



29. In which Earth layer are most convection currents that cause seafloor spreading thought to be located?

- A) crust B) asthenosphere
 C) outer core D) inner core

-
30. Which observation about the Mid-Atlantic Ridge region provides the best evidence that the seafloor has been spreading for millions of years?
- A) The bedrock of the ridge and nearby seafloor is igneous rock.
 - B) The ridge is the location of irregular volcanic eruptions.
 - C) Several faults cut across the ridge and nearby seafloor.
 - D) Seafloor bedrock is younger near the ridge and older farther away.
-