

Earthquake Practice

1) Base your answer to the following question 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.

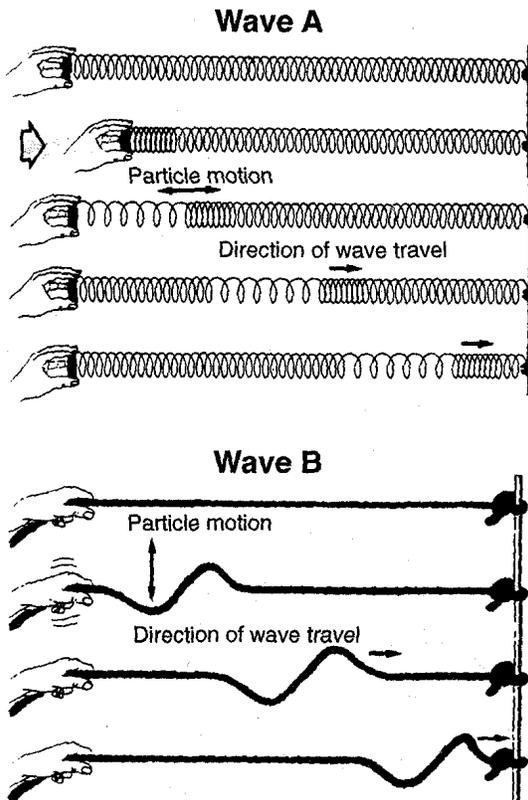
Data Table

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

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

- A) S-waves were not generated at the epicenter.
- B) S-waves cannot travel through liquids.
- C) Station W was located on solid bedrock.
- D) Station W was located on an island.

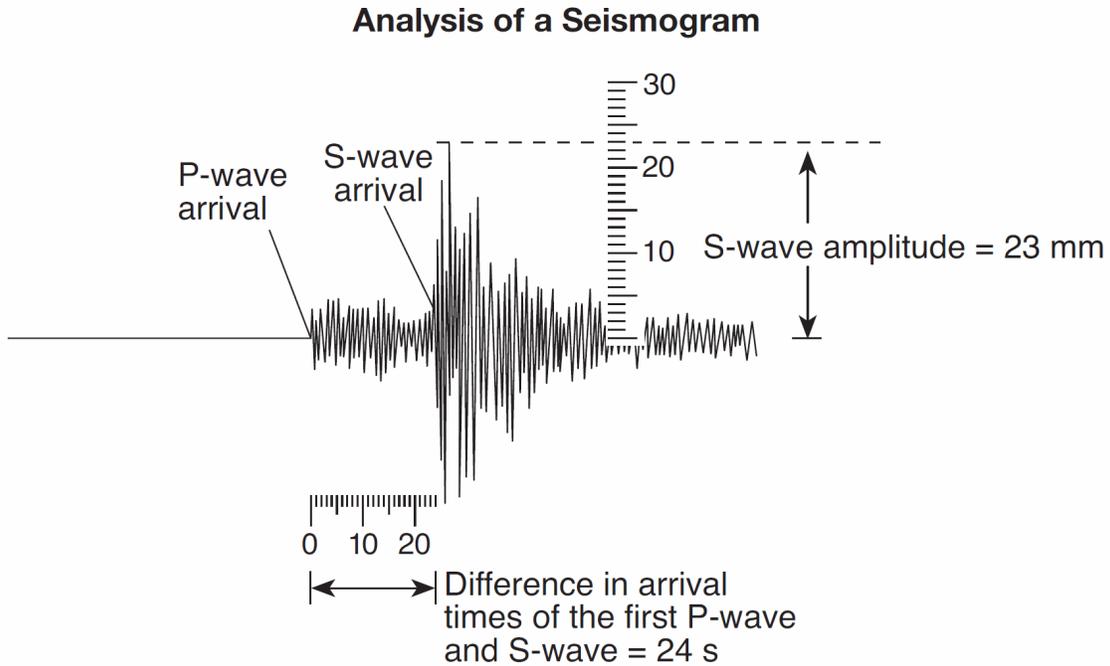
- 2) The diagrams below show demonstrations that represent the behavior of two seismic waves, A and B.



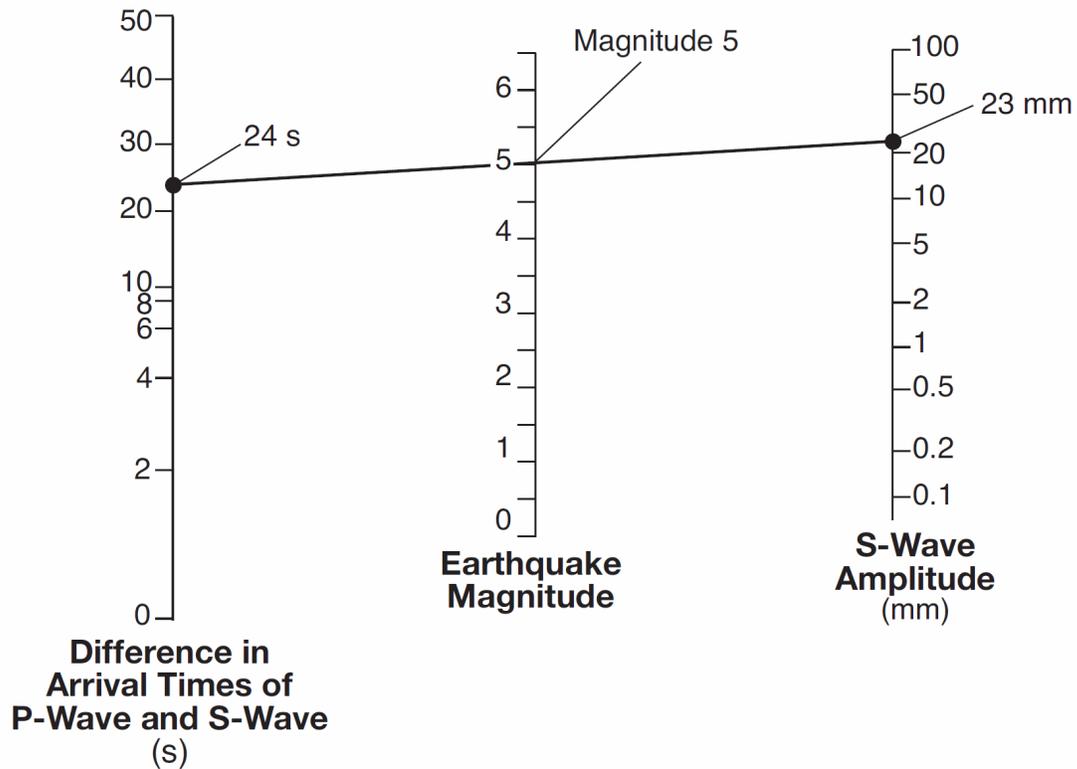
Which statement concerning the demonstrated waves is correct?

- A) Wave A represents a compressional wave, and wave B represents a shear wave.
- B) Wave A represents a shear wave, and wave B represents a compressional wave.
- C) Wave A represents compressional waves in the crust, and wave B represents compressional waves in the mantle.
- D) Wave A represents shear waves in the crust, and wave B represents shear waves in the mantle.

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- 3) The diagram below represents the analysis of a seismogram used to calculate an earthquake's magnitude on the Richter Scale. This seismogram shows the difference in arrival times, in seconds, of the first P-wave and S-wave and the amplitude of the S-wave in millimeters.



The diagram below represents how the earthquake's magnitude is determined by drawing a line connecting the difference in arrival times of the P-wave and the S-wave, and the S-wave amplitude.



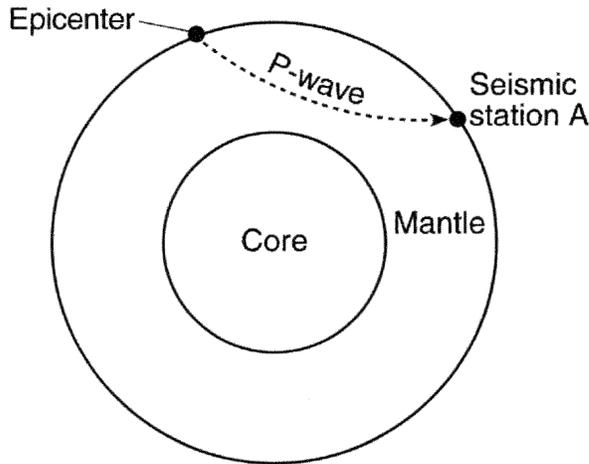
What is the magnitude of a recorded earthquake if the difference in arrival times of the first P-wave and S-wave is 2 seconds and the S-wave amplitude is 20 millimeters?

- A) 3.8 B) 2.0 C) 3.0 D) 4.8

4) A P-wave takes 5 minutes to travel from the epicenter of an earthquake to a seismic station. Approximately how many minutes will it take an S-wave to travel that same distance?

- A) 15 min C) 9 min
 B) 12 min D) 4 min

- 5) The cross section of Earth below represents a P-wave moving away from an earthquake epicenter. Seismic station A is shown on Earth's surface.



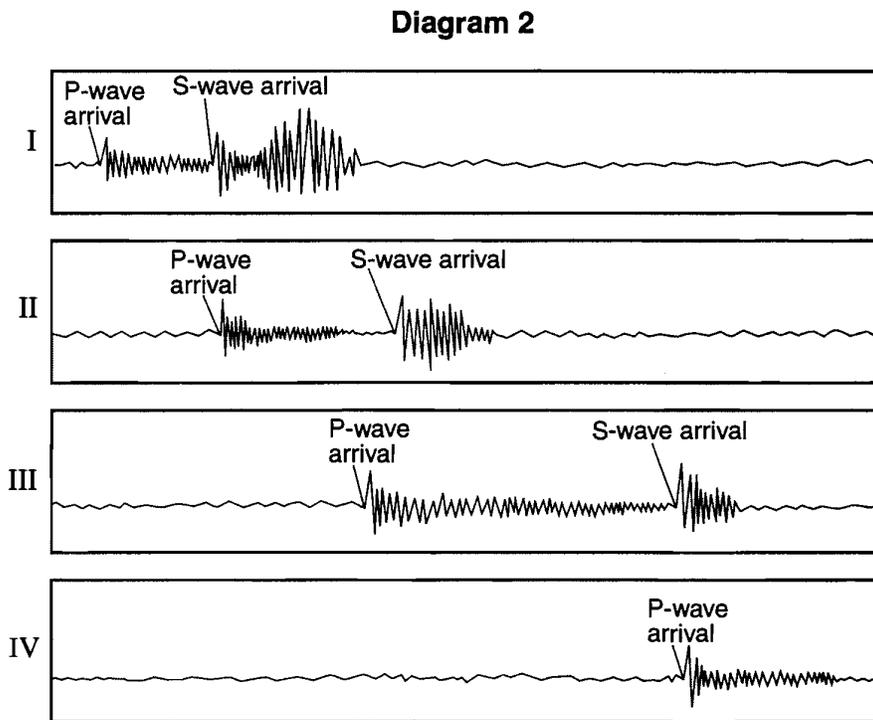
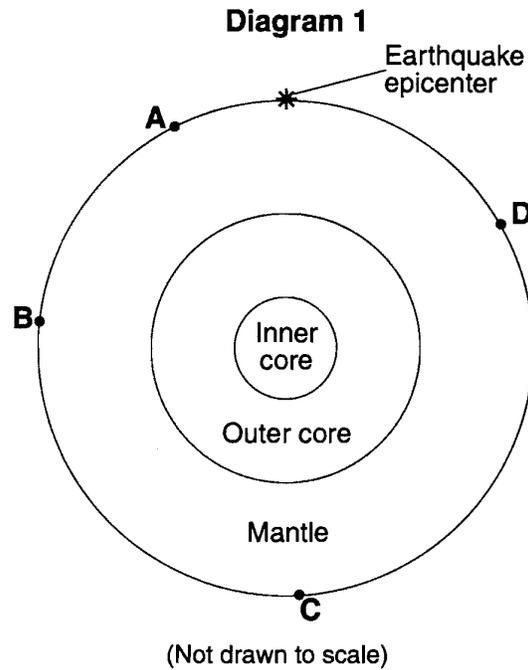
At station A, the first P-wave arrives 11 minutes 40 seconds after the earthquake. How long after the first P-wave arrives will the first S-wave arrive?

- A) 5 minutes 00 second
 B) 8 minutes 40 seconds
 C) 9 minutes 40 seconds
 D) 21 minutes 20 seconds
- 6) The arrival time of the first earthquake P-wave at a seismograph station was 10:11:20 (hours:minutes:seconds). If the epicenter of the earthquake is 8000 km away, what was the approximate arrival time of the first S-wave from this earthquake?
- A) 10:02:00 C) 10:20:40
 B) 10:09:20 D) 10:32:00

- 7) What is the approximate time difference between the first \bar{P} -wave and the first \bar{S} -wave recorded at a seismic station located 8000 kilometers from an earthquake's epicenter?

- A) 8 minutes 40 seconds
 B) 9 minutes 20 seconds
 C) 11 minutes 20 seconds
 D) 20 minutes 40 seconds

Base your answers to questions **8** and **9** on the diagrams below. Diagram 1 represents a cross section of Earth and its interior layers. The asterisk (*) shows the location of an earthquake epicenter. Letters A through D are seismic stations on Earth's surface. Diagram 2 shows four seismograms labeled I, II, III, and IV, which were recorded at seismic stations A, B, C, and D during the same time interval.



8) Station D is 8000 kilometers from the earthquake epicenter. How long did it take for the first P-wave to travel from the epicenter to station D?

- | | |
|--------------------------|--------------------------|
| A) 9 minutes 20 seconds | C) 20 minutes 40 seconds |
| B) 11 minutes 20 seconds | D) 4 minutes 20 seconds |

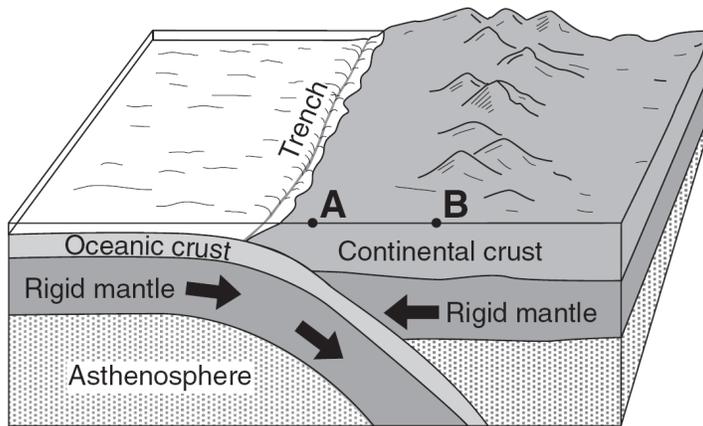
9) Which list correctly matches the seismograms with the seismic stations where they were recorded?

- A) seismogram I - station A
seismogram II - station B
seismogram III - station C
seismogram IV - station D
- B) seismogram I - station B
seismogram II - station D
seismogram III - station A
seismogram IV - station C
- C) seismogram I - station C
seismogram II - station B
seismogram III - station D
seismogram IV - station A
- D) seismogram I - station A
seismogram II - station D
seismogram III - station B
seismogram IV - station C

10) 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?

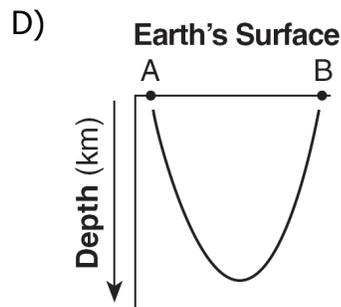
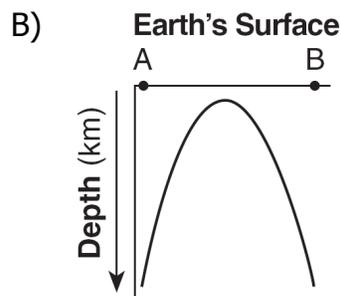
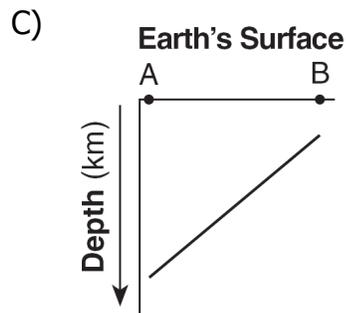
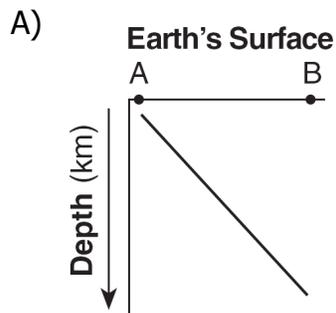
- A) 12:11:25 p.m. and 4000 km
- B) 12:11:25 p.m. and 6000 km
- C) 12:19:40 p.m. and 4000 km
- D) 12:19:40 p.m. and 6000 km

- 11) The block diagram below shows a tectonic plate boundary. Points A and B represent locations on Earth's surface.

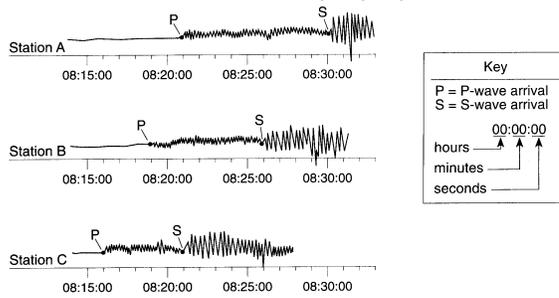


(Not drawn to scale)

Which graph best shows the depths of most major earthquakes whose epicenters lie between A and B?



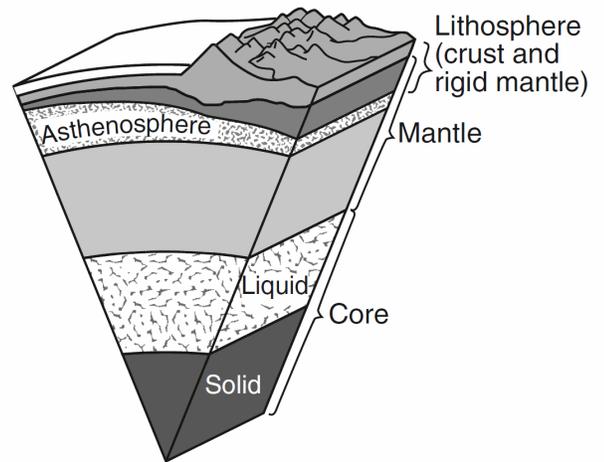
12) The diagram below represents three seismograms showing the same earthquake as it was recorded at three different seismic stations, A, B, and C.



Which statement correctly describes the distance between the earthquake epicenter and these seismic stations?

- A) A is closest to the epicenter, and C is farthest from the epicenter.
- B) B is closest to the epicenter, and C is farthest from the epicenter.
- C) C is closest to the epicenter, and A is farthest from the epicenter.
- D) A is the closest to the epicenter, and B is the farthest from the epicenter.

13) 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

14) The arrival of P-waves and S-waves at a seismic station indicated that an earthquake occurred 4,000 kilometers from the station. The P-wave arrived at 3:32:30 p.m. When did the earthquake occur?

- A) 3:25:30 p.m. C) 3:27:00 p.m.
- B) 3:32:23 p.m. D) 3:39:30 p.m.

Answer Key
Earthquake Practice2

- 1) **B**
- 2) **A**
- 3) **C**
- 4) **C**
- 5) **C**
- 6) **C**
- 7) **B**
- 8) **B**
- 9) **D**
- 10) **B**
- 11) **A**
- 12) **C**
- 13) **A**
- 14) **A**