

1. Based on the *Earth Science Reference Tables*, approximately how far away from the receiving station is the epicenter of an earthquake if the difference in arrival times of P- and S-waves at the station is 6 minutes and 30 seconds?

- (1) 3,000 km
- (2) 5,000 km
- (3) 6,300 km
- (4) 8,000 km

2. A seismograph station records a difference in arrival time between the S- and P-wave of 4 minutes. About how far away is the earthquake epicenter? (Refer to the *Earth Science Reference Tables*.)

- (1) 1,000 km
- (2) 1,900 km
- (3) 2,600 km
- (4) 5,200 km

3. Base your answer to the following question on the *Earth Science Reference Tables*.

An earthquake occurred at 5:00:00 a. m. At what time would the P-wave reach a seismic station 3,000 kilometers from the epicenter?

- (1) 5:04:30 a.m.
- (2) 5:05:40 a.m.
- (3) 5:10:12 a.m.
- (4) 6:15:00 a. m.

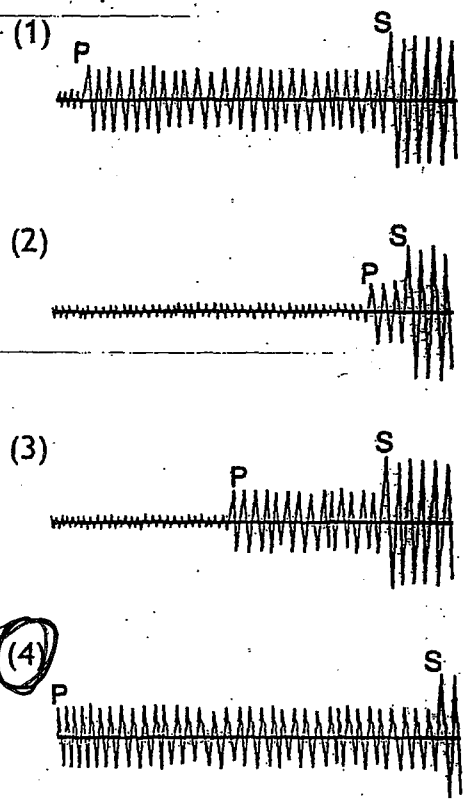
4. Following an earthquake, a seismograph station recorded the arrival of a P-wave at 3:09:30 a.m. and an S-wave at 3:14:00 a.m. According to the *Earth Science Reference Tables*, what is the distance from the seismograph station to the epicenter of the earthquake?

- (1) 1,200 km
- (2) 3,000 km
- (3) 6,100 km
- (4) 7,500 km

5. An earthquake's P-wave traveled 4,800 kilometers and arrived at a seismic station at 5:10 p.m. At approximately what time did the earthquake occur?

- (1) 5:02 p.m.
- (2) 5:08 p.m.
- (3) 5:10 p.m.
- (4) 5:18 p.m.

6. The diagrams below represent seismograms of the same earthquake recorded in four different locations. Which seismogram was recorded farthest from the epicenter of the earthquake?



KEY

7. An earthquake occurred at 5:00:00 a.m. According to the *Earth Science Reference Tables*, at what time would the P-wave reach a seismic station 3,000 kilometers from the epicenter?

- (1) 5:01:40 a.m.
- (2) 5:04:30 a.m.
- (3) 5:05:40 a.m.
- (4) 5:10:15 a.m.

8. According to the *Earth Science Reference Tables*, what is the approximate total distance traveled by an earthquake's P-wave in its first 9 minutes?

- (1) 2,600 km
- (2) 5,600 km
- (3) 7,600 km
- (4) 12,100 km

1. A seismograph station recorded the arrival of the first P-wave at 7:32 p.m. from an earthquake that occurred 4,000 kilometers away. What time was it at the station when the earthquake occurred?

4,000 km

- A) 7:20 p.m.
- B) 7:25 p.m.
- C) 7:32 p.m.
- D) 7:39 p.m.

4,000 km
P-wave.

h	m	s
7	32	00
-	7	00
7	25	00

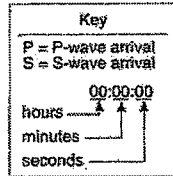
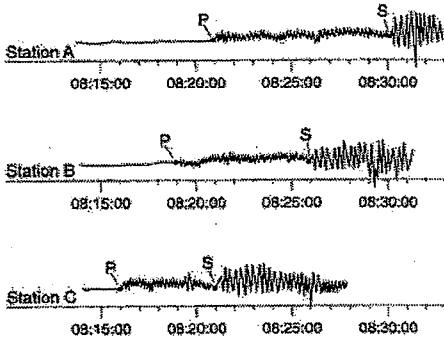
2. An earthquake's P-wave traveled 4,800 kilometers and arrived at a seismic station at 5:10 p.m. At approximately what time did the earthquake occur?

- A) 5:02 p.m.
- B) 5:08 p.m.
- C) 5:10 p.m.
- D) 5:18 p.m.

h	m	s
5	10	00
-	8	00
5	02	00

p-Arrival
- p-Travel
5:02:00 origin Time

3. 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?

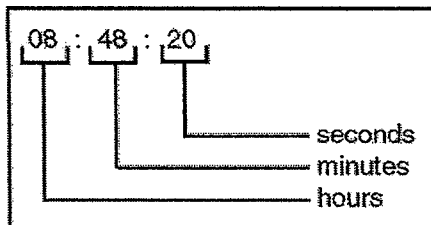
- A) A is closest to the epicenter, and C is farthest from the epicenter.
- B) B is closest to the epicenter, and C is farthest from the epicenter.
- C) C is closest to the epicenter, and A is farthest from the epicenter.
- D) A is the closest to the epicenter, and B is the farthest from the epicenter.

Key.

Base your answers to questions 4 through 6 on the data table below, which gives information collected at seismic stations *A*, *B*, *C*, and *D* for the same earthquake. Some of the data has been deliberately omitted.

Seismic Station	P-Wave Arrival Time	S-Wave Arrival Time	Difference in Arrival Times	Distance to Epicenter
<i>A</i>	08:48:20	No S-waves arrived		
<i>B</i>	08:42:00		00:04:40	
<i>C</i>	08:39:20		00:02:40	
<i>D</i>	08:45:40			6,200 km

Key for Reading Time on the Table



4. How long did it take the *P*-wave to travel from the epicenter of the earthquake to seismic station *D*?

- A) 00:46:20 B) 00:39:20 C) 00:17:20 D) 00:09:40

Distance = 6,200 km

5. What is the approximate distance from station *C* to the earthquake epicenter?

- A) 3,200 km B) 2,400 km C) 1,600 km D) 1,000 km

Wedge Method - Lag Time = 2:40

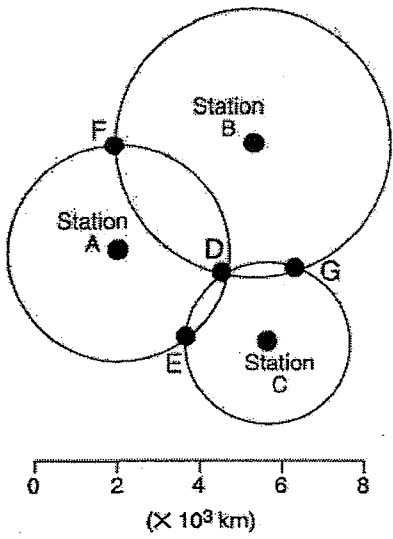
6. What is the most probable reason for the absence of *S*-waves at station *A*?

- A) *S*-waves cannot travel through liquids. A
B) *S*-waves were not generated at the epicenter.
C) Station *A* was located on solid bedrock.
D) Station *A* was located too close to the epicenter.

S-waves can't pass through
Liquids outer core

1 Key

Base your answers to questions 7 and 8 on the diagram below, which represents seismic stations A, B, and C. The distance from each station to an earthquake's epicenter is plotted.



7. The *P*-wave of an earthquake originating 2,600 kilometers from seismic station A arrived at 5:24:45 a.m. What was the arrival time of the *S*-wave from the same earthquake?

- A) 1:24:45 a.m.
- B) 5:21:05 a.m.
- C) 5:28:45 a.m.
- D) 9:24:05 a.m.

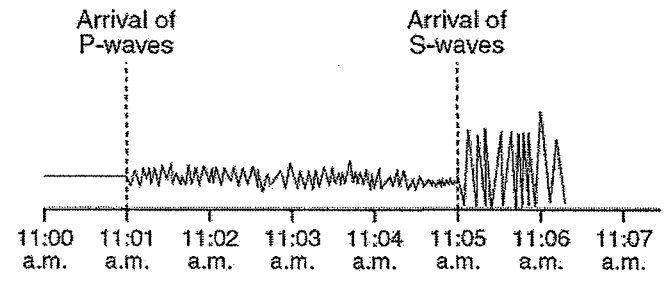
8. The epicenter is closest to point

- A) D
- B) E
- C) F
- D) G

9. The epicenter of an earthquake is 6,000 kilometers from an observation point. What is the difference in travel time for the *P*-waves and *S*-waves?

- A) 7 min 35 sec
- B) 9 min 20 sec
- C) 13 min 10 sec
- D) 17 min 00 sec

10. Base your answer to the following question on the earthquake seismogram below.



When did the first *P*-waves arrive at this seismic station?

- A) 3 minutes after an earthquake occurred 2,600 km away
- B) 5 minutes after an earthquake occurred 2,600 km away
- C) 9 minutes after an earthquake occurred 3,500 km away
- D) 11 minutes after an earthquake occurred 3,500 km away