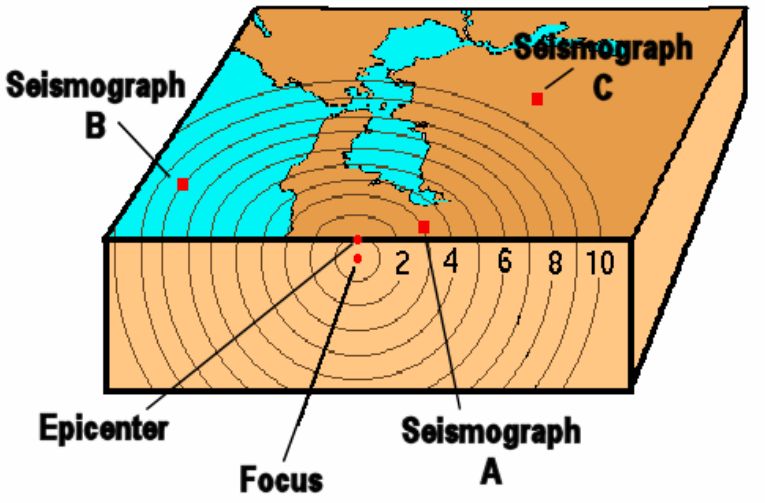
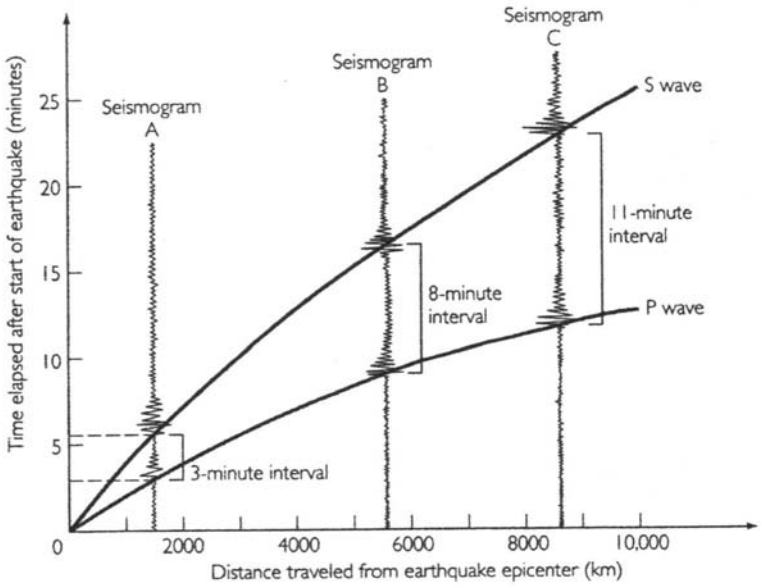
(a) The contour numbers in this diagram give the time interval (in minutes) between the arrival of first P and first S waves at successive distances from the epicenter of an earthquake. Because P waves travel about twice as fast as S waves, the further the waves travel, the wider becomes the interval between the arrival of the different waves. Seismographic station A, for example, which is closer to the epicenter, recorded a 3-miniute interval; whereas more distant station B recorded an 8-minuite interval. The intervals between P and S waves are a critical factor in interpreting seismographic readings.





(b) Seismic time-travel curves, like the ones shown in this graph, are basic tools for determining the distance of an earthquake from the seismograph that records it. Geologists at station A, where a 3-minute interval between P and S waves was recorded, can match this interval to the corresponding space between the P and S curves on the graph and determine that their distance from the epicenter was 1500 km. In the same way, seismic recordings at station B, with an 8-minute interval between P and S waves, yields a distance of 5600 km, and at station C, with an 11-minute interval, a distance of 8600 km.

(c) Knowing the distance from the epicenter of three different stations, geologists can pinpoint the location of the epicenter using a map and some simple geometry. They draw three circles, each one centered on one of the three stations and each having a radius equal to the station's distance from the epicenter. The epicenter lies at the single point where the three circles intersect. (The epicenter and depth of focus are now determined by a computer that simulates this graphical method.)

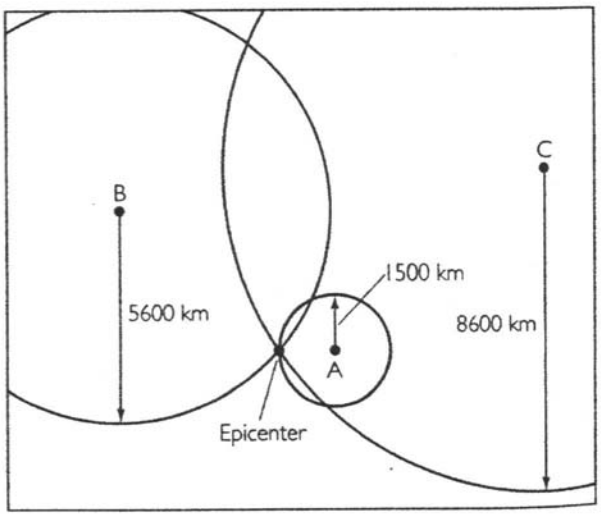


FIGURE 18.11 – From readings at different seismographic stations, geologists can locate the epicenter of an earthquake.