Locating an Epicenter

Purpose To locate the epicenter of an earthquake

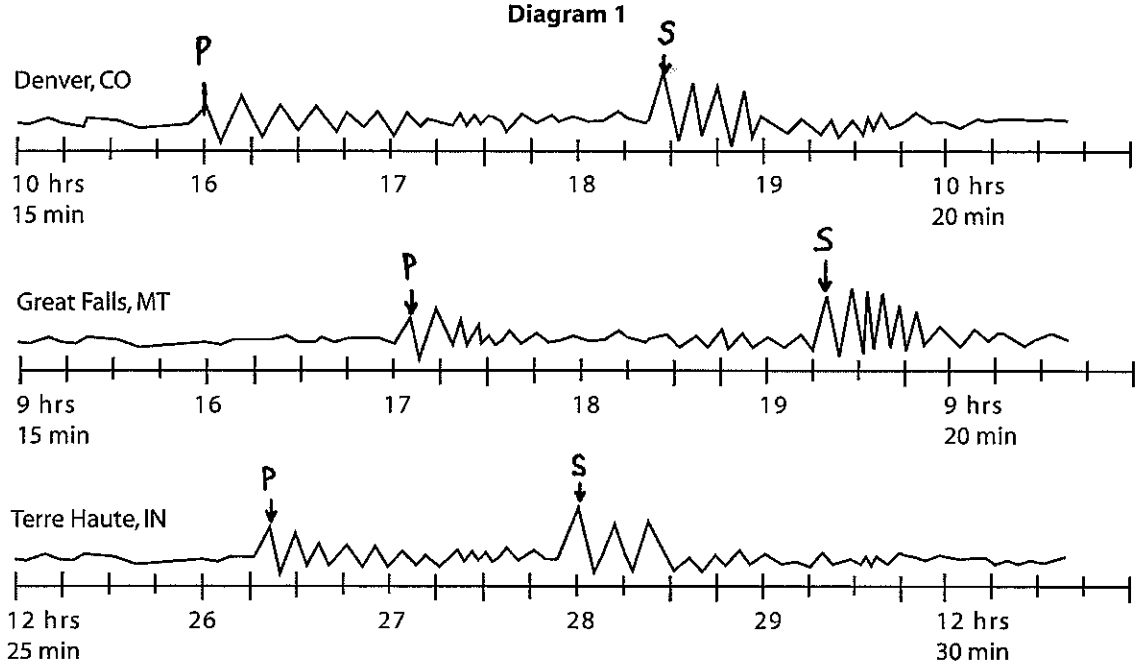
Materials
drawing compass
paper

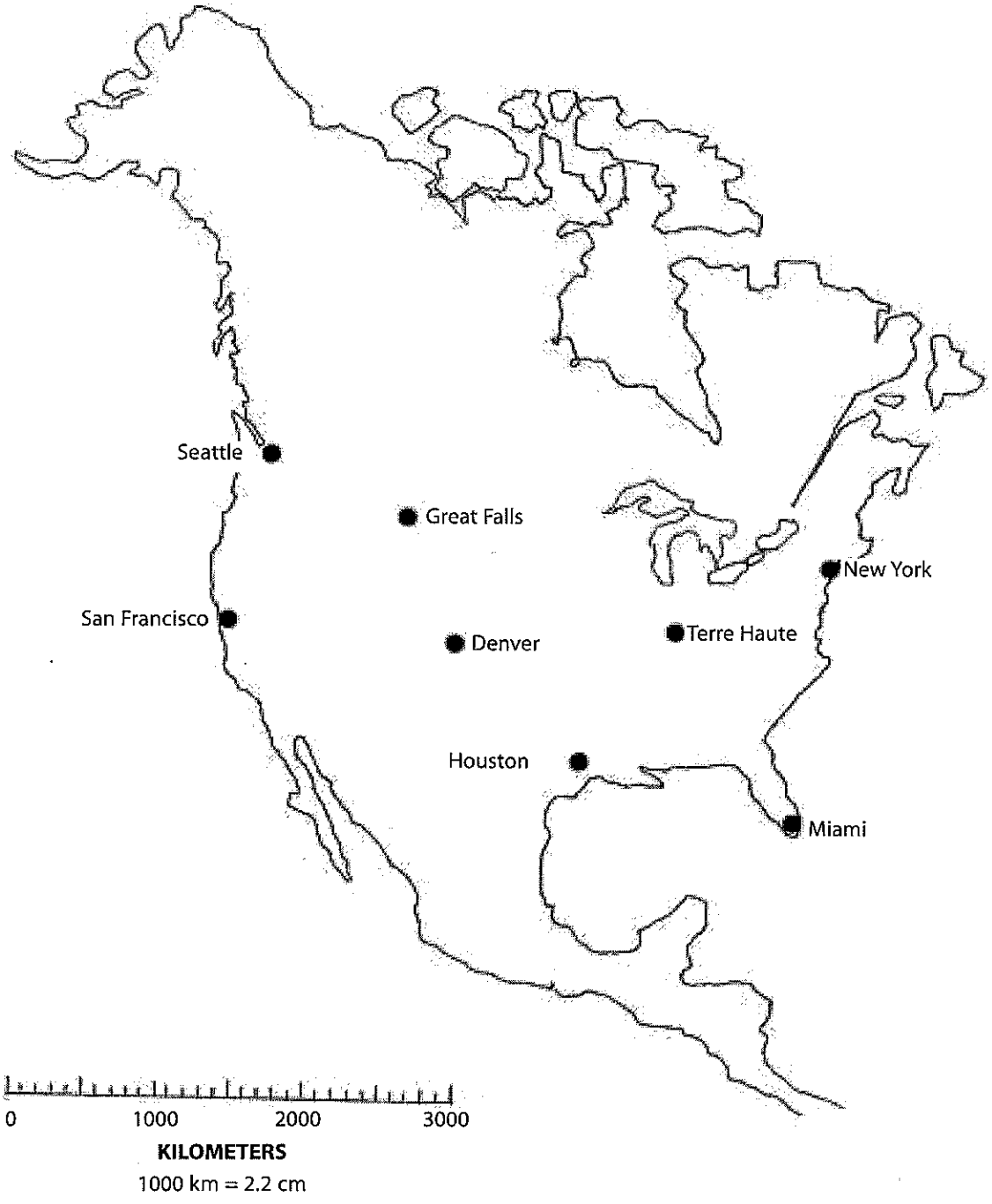
Background: An earthquake is any shaking or trembling of the Earth's crust. It is estimated that there are over 150,000 earthquakes around the world each year. However, only a few of them cause serious damage. The major cause of earthquakes is faulting, the sudden slipping or breaking of rocks beneath the Earth's surface. As the rocks break apart, the forces that have been acting upon them are relieved, causing a tremendous amount of energy to be released in the form of shock waves or vibrations. Some of the shock waves travel on the surface of the Earth and are called surface waves. The waves that travel through the body of the Earth are called Primary waves (P waves) and secondary waves (S waves). P waves can travel through solids, liquids, and gases, but S waves can travel only through solids. P waves are known to travel faster than S waves, but the speed of both P and S waves depends on the density of the rocks through which they travel. When the P and S waves reach the surface of the Earth, they set up new waves that travel along the surface of the Earth like ripples on a pond. These waves are called long waves (L waves). These surface waves are slower than the S and P waves, and they cause most of the damage and destruction to buildings.

Procedure

1. Study the three sections of seismograms shown below in diagram 1.
2. Each seismogram indicates the arrival time of the P waves and S waves of the same earthquake, as recorded in three different cities. Locate the arrival time of the P waves for each seismogram to the nearest 15 seconds and record in data chart 1 (p. 56).
3. Locate the arrival time of the S waves for each seismogram and record in data chart 1.
4. Determine the difference, in minutes and seconds, between the arrival time of the P and S waves on each seismogram and record in data chart 1.

Diagram 1




North America
Seattle
Great Falls
New York
San Francisco
Denver
Terre Haute
Houston
Miami
0
1000
2000
3000
KILOMETERS
1000 km = 2.2 cm