

**CHAPTER 2****REAL-WORLD LAB****Careers in Science**

## Locating an Epicenter

Geologists who study earthquakes are called seismologists. If you were a seismologist, you would receive data from all across the country. Within minutes after an earthquake, seismographs located in Denver, Houston, and Miami would record the times of arrival of the P waves and S waves. You would use this data to zero in on the exact location of the earthquake's epicenter.

### ◆ Problem

How can you locate an earthquake's epicenter?

### ◆ Skills Focus

interpreting data, drawing conclusions

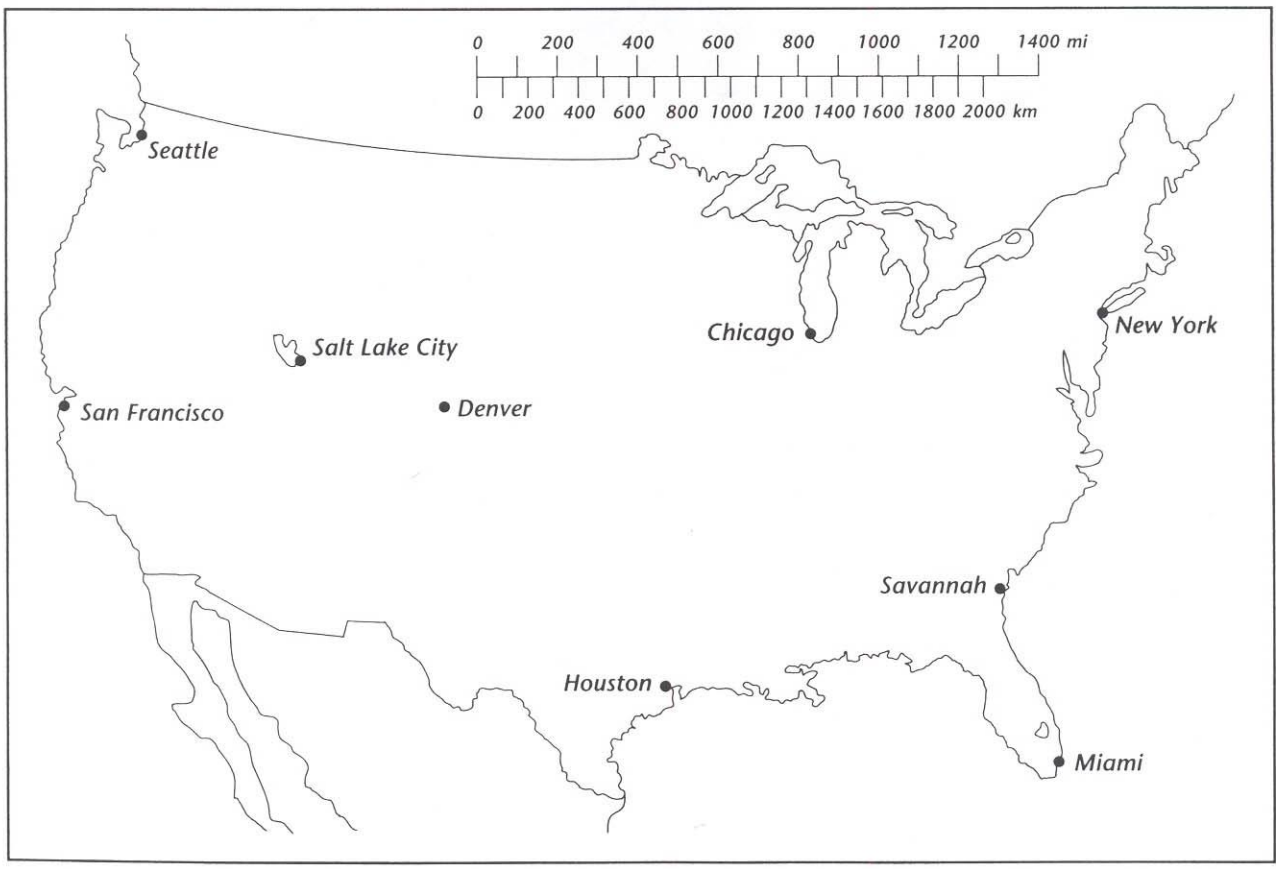
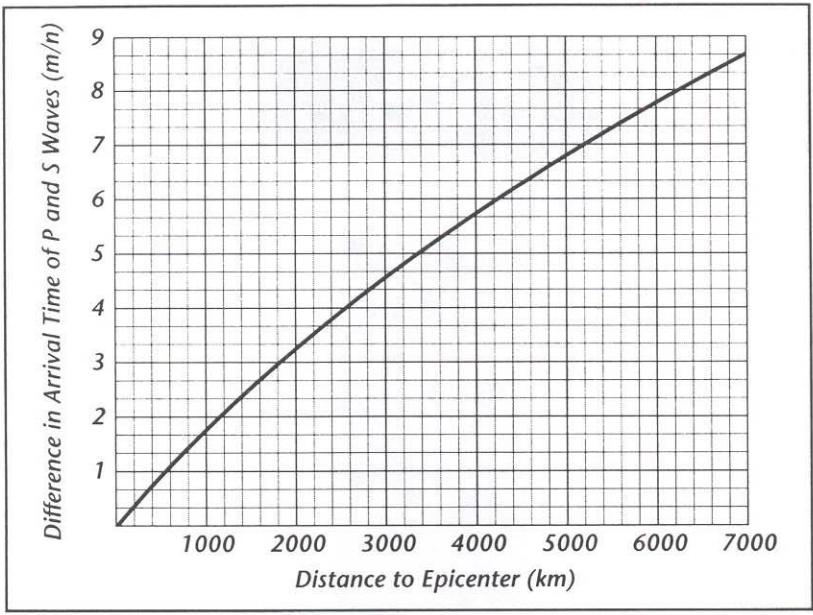
### ◆ Materials

drawing compass with pencil  
outline map of the United States

### ◆ Procedure Review the safety guidelines in Appendix A.

1. Review the data table on page 67 showing differences in earthquake arrival times.
2. The graph shows how the difference in arrival times between P waves and S waves depends on the distance from the epicenter of the earthquake. Find the difference in arrival time for Denver on the  $y$ -axis of the graph. Follow this line across to the point at which it crosses the curve. To find the distance to the epicenter, read down from this point to the  $x$ -axis of the graph. Enter this distance in the data table.
3. Repeat Step 2 for Houston and Miami.
4. Set your compass at a radius equal to the distance from Denver to the earthquake epicenter that you recorded in your data table.
5. Draw a circle with the radius determined in Step 4, using Denver as the center. Draw the circle on the map. (*Hints:* Draw your circles carefully. You may need to draw some parts of the circles off the map.)
6. Repeat Steps 4 and 5 for Houston and Miami.

**REAL-WORLD LAB** (continued)



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**Real – World Lab** (continued)

• **Data Table**

City	Difference in P and S Wave Arrival Times	Distance To Epicenter
Denver, Colorado	2 min 10 s	
Houston, Texas	3 min 55 s	
Miami, Florida	5 min 40 s	

• **Analyze and Conclude**

*Answer the following questions in complete sentences.*

1. Observe the three circles you have drawn to locate the earthquake’s epicenter.  

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2. Which city on the map is closet to the earthquake epicenter? How far, in kilometers, is this city from the epicenter?  

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3. In which of the three cities listed in the data table would seismographs detect the earthquake first? Last?  

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4. When you are trying to locate an epicenter, why is it necessary to know the distance from the epicenter for at least three recording stations?  

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5. About how far is the epicenter that you found from San Francisco? What would the difference in arrival times of the P waves and S waves be for a recording station in San Francisco?  

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6. What happens to the difference in arrival times between P waves and S waves as the distance from the earthquake increases?  

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7. **Apply** Working as a seismologist, you find the epicenters of many earthquake in a region. What features of Earth’s crust would you expect to find in this region?  

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