

Earthquakes • Skills Lab

Finding the Epicenter

Problem

How can you locate an earthquake's epicenter?

Skills Focus

interpreting data, drawing conclusions

Materials

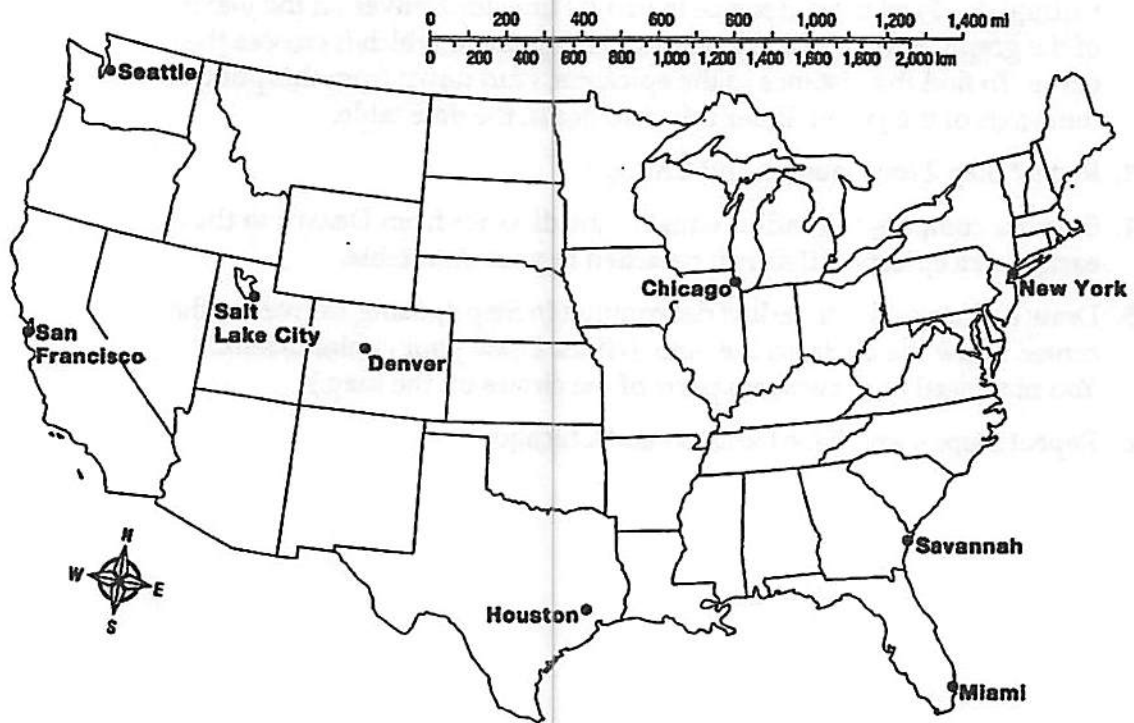
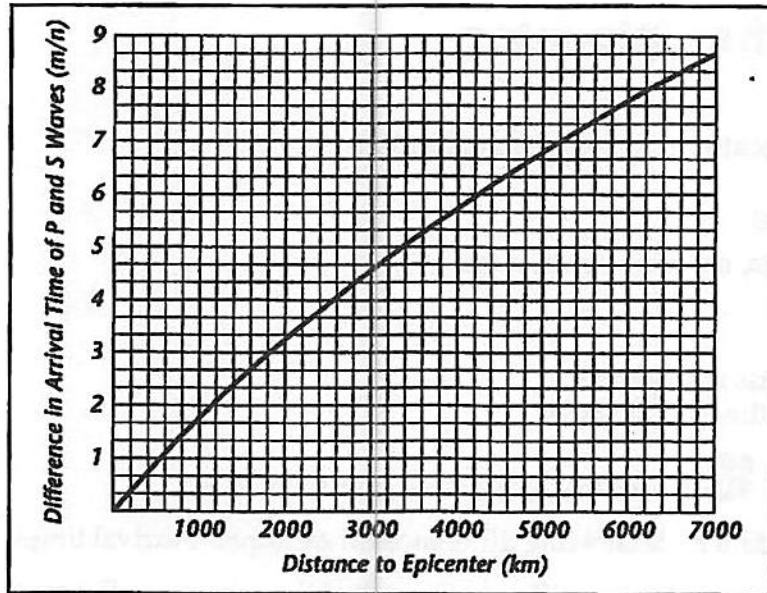
drawing compass with pencil
outline map of the United States

Procedure  Review the safety guidelines in Appendix A.

1. Review the data table 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 Chicago.
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 Chicago.

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Finding the Epicenter *(continued)*



Name _____ Date _____ Class _____

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DATA TABLE

| City | Difference in P and S Wave Arrival Times | Distance to Epicenter |
|------------------|--|-----------------------|
| Denver, Colorado | 2 min 10 s | 1200 km |
| Houston, Texas | 3 min 55 s | 2500 km |
| Miami, Florida | 5 min 40 s | 4000 km |

Analyze and Conclude

Answer the following questions on a separate sheet of paper.

1. Observe the three circles you have drawn. Where is the earthquake's epicenter?
2. Which city on the map is closest to the earthquake epicenter? How far, in kilometers, is this city from the epicenter?
3. In which of the three cities listed in the data table would seismographs detect the earthquake first? Last?
4. About how far from San Francisco is the epicenter that you found? What would the difference in arrival times of the P waves and S waves be for a recording station in San Francisco?
5. What happens to the difference in arrival times between P waves and S waves as the distance from the earthquake increases?
6. Review the procedure you followed in this lab and then answer the following question. 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?

More to Explore

You have just located an earthquake's epicenter. Find this earthquake's location on the map of Earthquake Risk in the United States in your textbook. What is the risk of earthquakes in the area of this quake?

Now look at the map of Earth's Lithospheric Plates in your textbook. What conclusions can you draw from this map about the cause of earthquakes in this area?

1940

| Year | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
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