Name: _____

Date: _____ Period: _____

Lab Activity: Locating Epicenters

INTRODUCTION:

Geologists who study earthquakes are called seismologists. If you were a seismologist, you would receive earthquake data from all across the country. Within minutes, seismologists would record the times of arrival of the P waves and S waves. From the seismic wave data collected, they can than use this data to zero in on the exact location of the earthquake's epicenter.

OBJECTIVE:

You will learn how to interpret a seismogram and use the data from three different seismograms to locate the epicenter of an earthquake.

VOCABULARY:

Fault -

Epicenter -

Focus -

Focal Depth -

P-wave -

S-wave -

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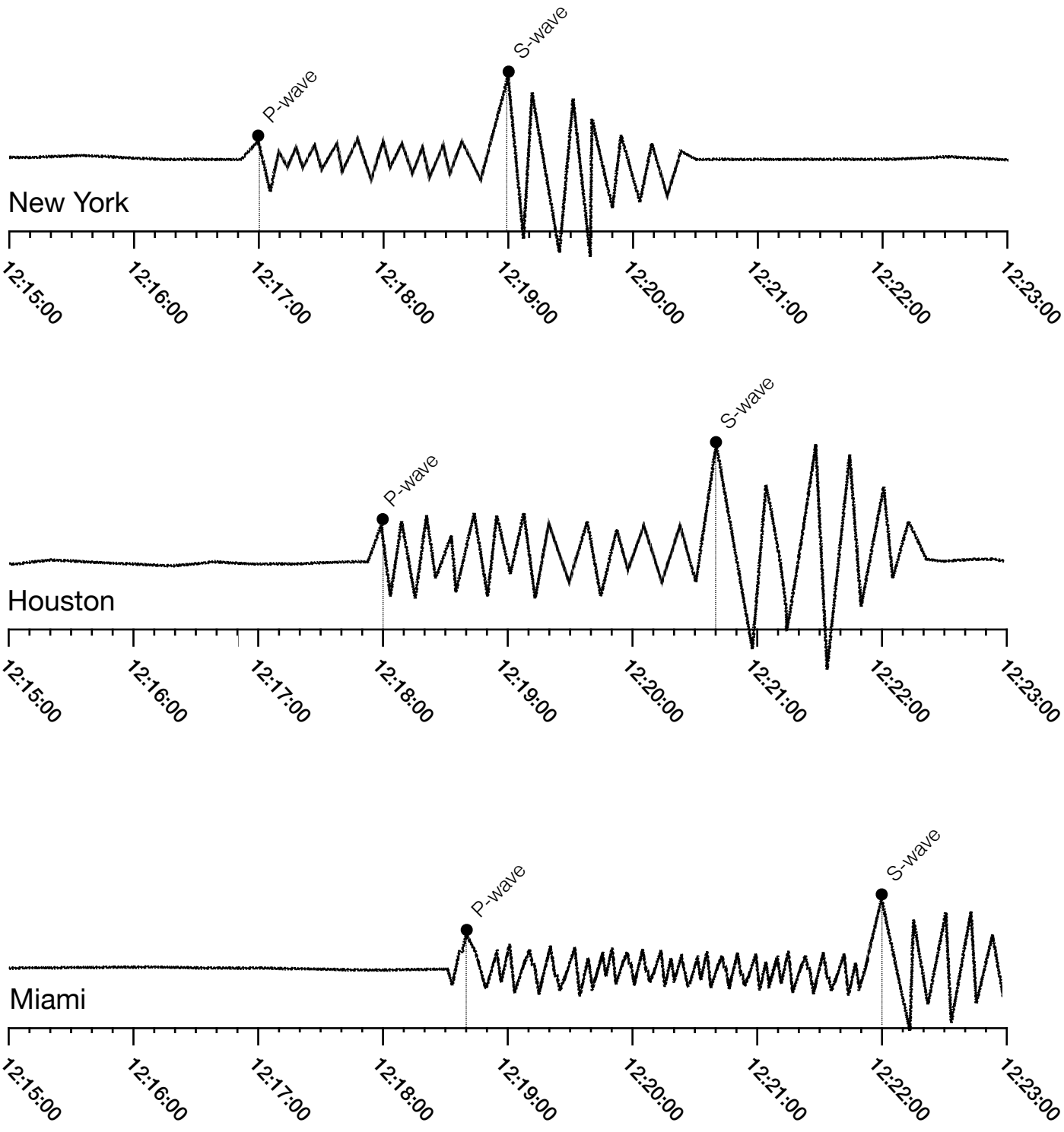
PROCEDURE A:

Use the three seismograms from “Seismograms A” to calculate the following for each city and fill it into the chart below:

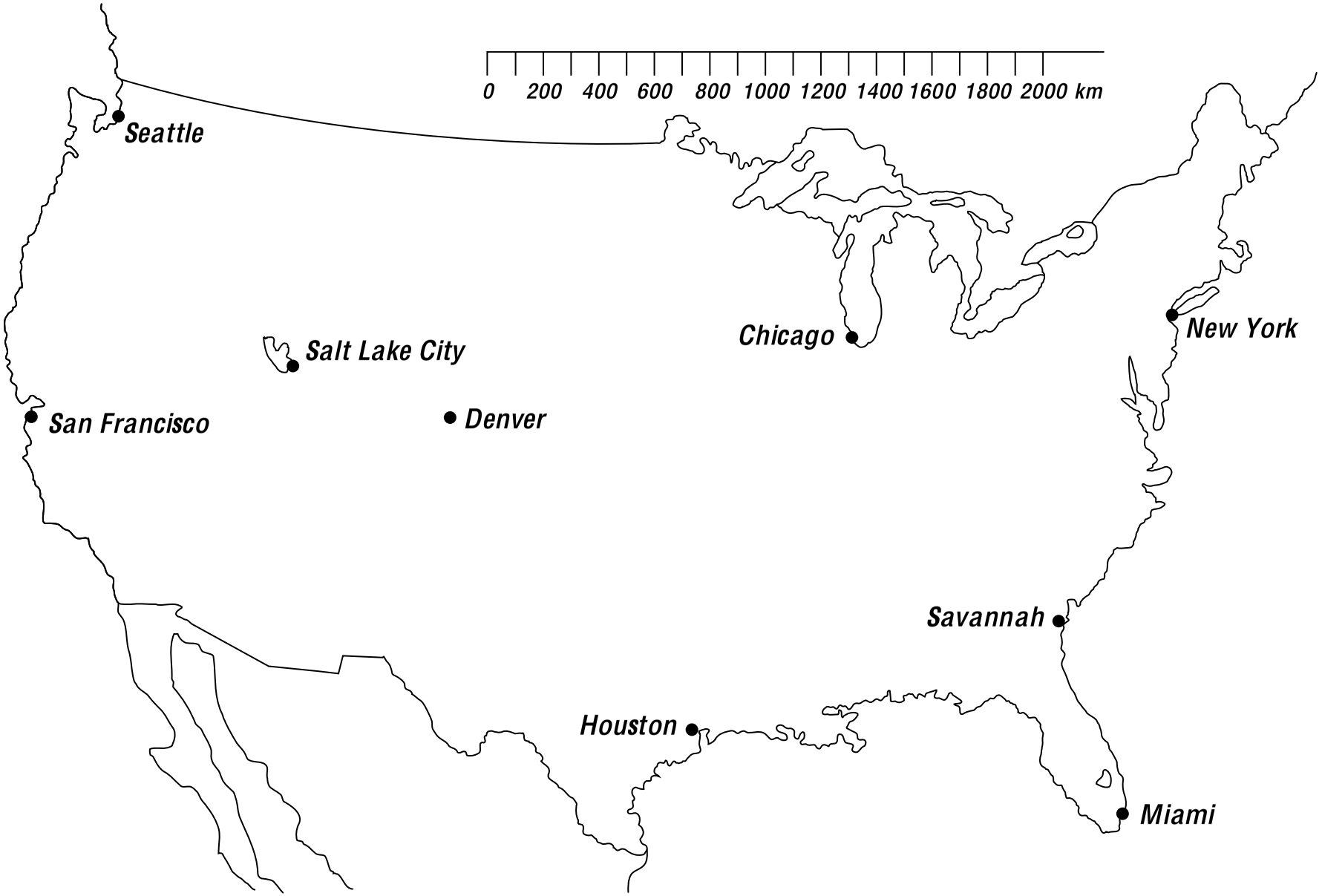
1. The arrival time for the P and S wave.
2. The difference in the arrival time between P and S-waves.
3. The distance (in km) of the epicenter from each city.
4. The length of time it took for the P-wave to travel from the epicenter to each city.
5. Calculate the time at which the P-wave started.
6. Locate the epicenter on “Map A” by constructing a circle whose radius is equal to the distance from the city to the epicenter for all three cities.
7. Where all three circles meet, draw an arrow and label it “epicenter”.

Station	Arrival Time		Difference in Arrival Time	Distance to the Epicenter	P-wave Travel Time	Time of Origin
	P-wave	S-wave				
New York						
Houston						
Miami						

Seismograms A



Map A


0 200 400 600 800 1000 1200 1400 1600 1800 2000 km
Seattle
Salt Lake City
Chicago
New York
San Francisco
Denver
Savannah
Houston
Miami

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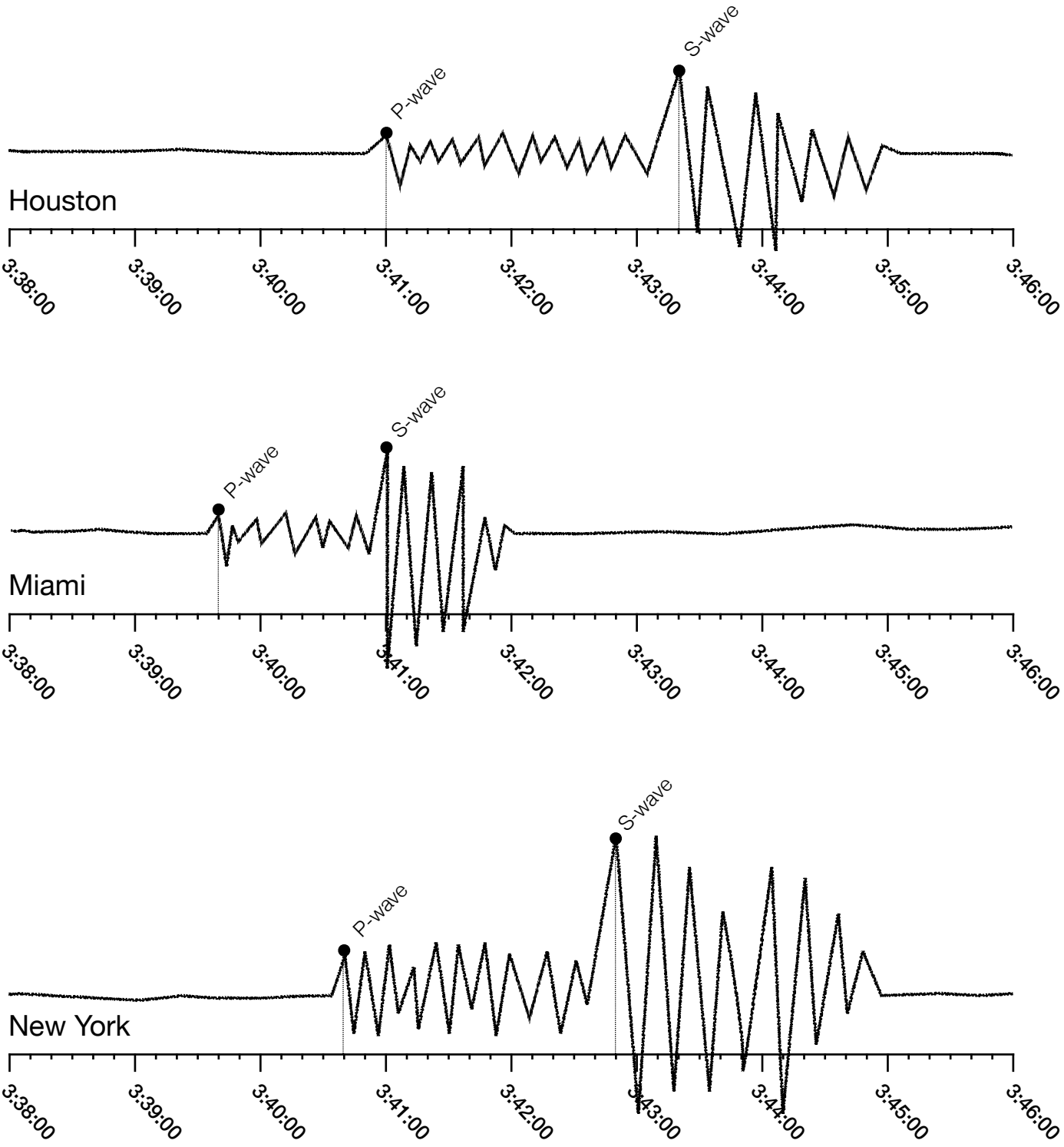
PROCEDURE B:

Use the three seismograms from “Seismograms B” to calculate the following for each city and fill it into the chart below:

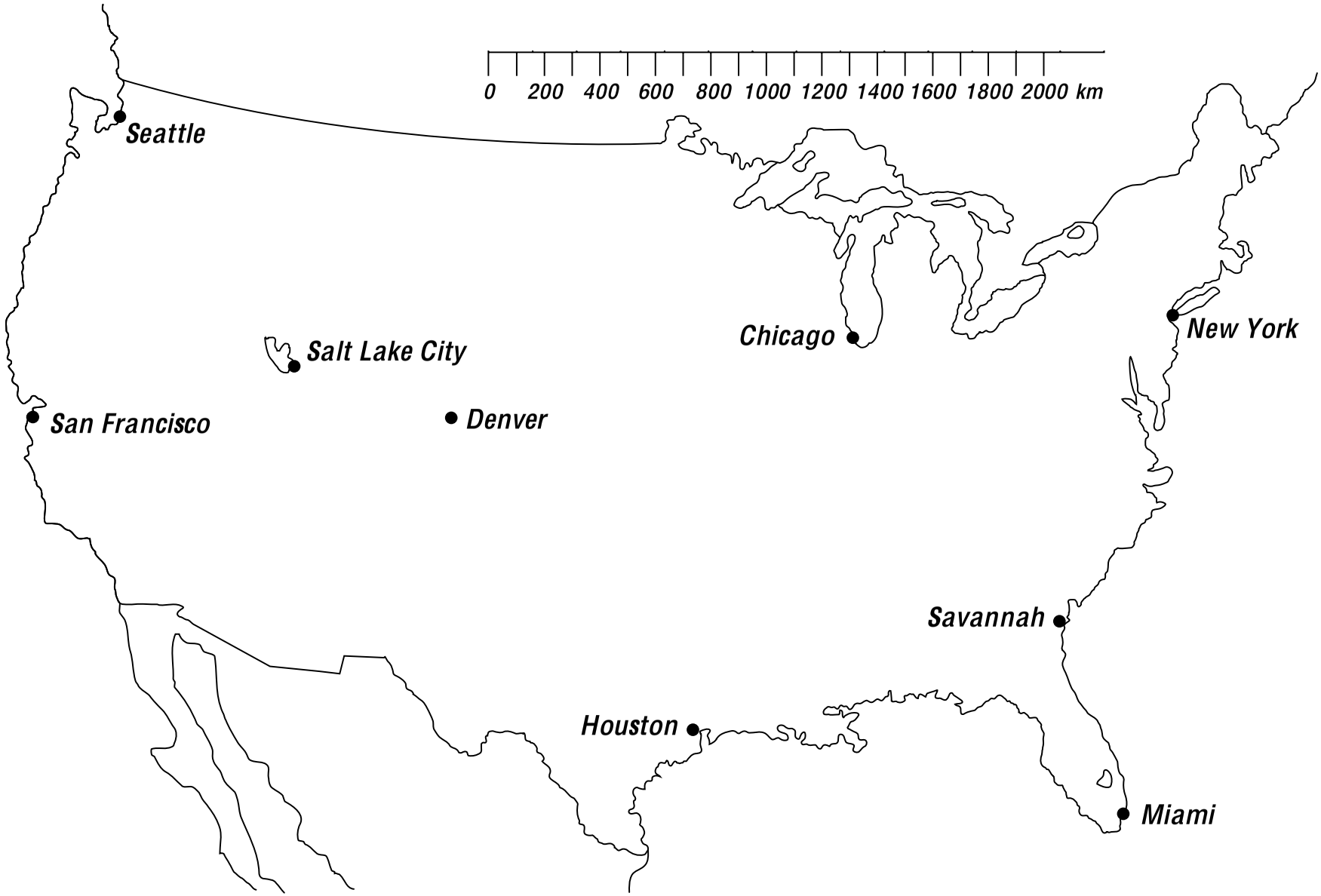
1. The arrival time for the P and S wave.
2. The difference in the arrival time between P and S-waves.
3. The distance (in km) of the epicenter from each city.
4. The length of time it took for the P-wave to travel from the epicenter to each city.
5. Calculate the time at which the P-wave started.
6. Locate the epicenter on “Map B” by constructing a circle whose radius is equal to the distance from the city to the epicenter for all three cities.
7. Where all three circles meet, draw an arrow and label it “epicenter”.

Station	Arrival Time		Difference in Arrival Time	Distance to the Epicenter	P-wave Travel Time	Time of Origin
	P-wave	S-wave				
Houston						
Miami						
New York						

Seismograms B



Map B


0 200 400 600 800 1000 1200 1400 1600 1800 2000 km
Seattle
Salt Lake City
Chicago
New York
San Francisco
Denver
Savannah
Houston
Miami

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DISCUSSION QUESTIONS:

1. What is the approximate location of the epicenter for the seismograms A?

2. What is the approximate location of the epicenter for the seismograms B?

3. Why is three the minimum number of stations necessary to locate an epicenter?

4. Why does the time between the arrival of the P-wave and S-wave become greater and greater as you get farther away from the epicenter?

CONCLUSION: Describe, step by step, how the epicenter of an earthquake can be located?