INSTRUCTOR _____ PERIOD ____ NAME _____

PARTNER _____

TOPIC XII: The Dynamic Crust

LAB 12-1: FINDING EPICENTERS

INTRODUCTION: Earthquakes occur when there is movement along a fault. The friction between rock masses rubbing against one another generates shock waves which travel through the earth. These shock waves (seismic waves) created by the earthquake are radiated in every direction from the focus, the point in the earth where the actual movement takes place.

An earthquake occurs every 30 seconds, day after day. Most of these are so weak they would go unnoticed without the use of sensitive modern instruments called seismographs.

In this lab you will use seismograms from 3 distant stations to locate the epicenter, the point on the earth's surface directly above the focus.

OBJECTIVE: You will learn to interpret a seismogram and, using differences in seismic waves, locate the epicenter of an earthquake.

VOCABULARY:

fault:

epicenter:

focus:

focal depth:

P-wave:

S-wave:

seismograph:

seismogram:

PROCEDURE A:

The diagram, Finding Epicenters, illustrates the method of using the difference in arrival times of P and S waves to determine the distance to the epicenter. Using the three seismograms provided and the Earthquake Travel Time Chart in the Appendix, calculate the following for each city: (Enter on the Report Sheet.)

1. The arrival times for P and S waves.

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. Since you now know when the P-wave arrived at a city and how long it had to travel, calculate the time at which the P-wave started. (Origin Time).

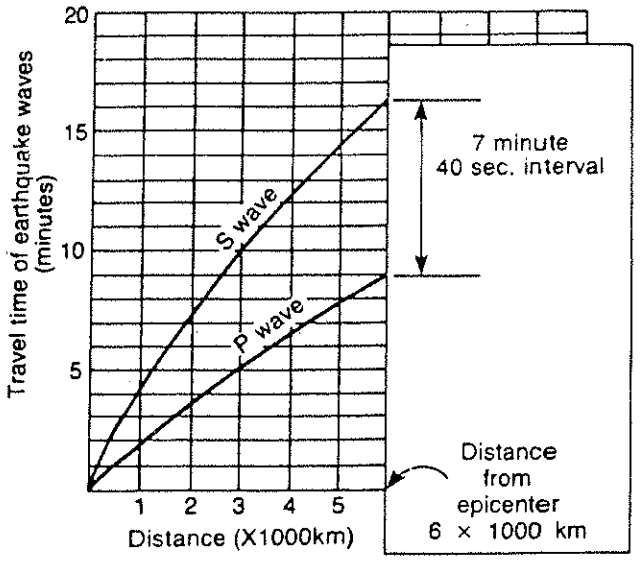
PROCEDURE B:

1. a. To locate the epicenter on the map, for each city construct a circle whose radius is equal to the distance from the city to the epicenter.

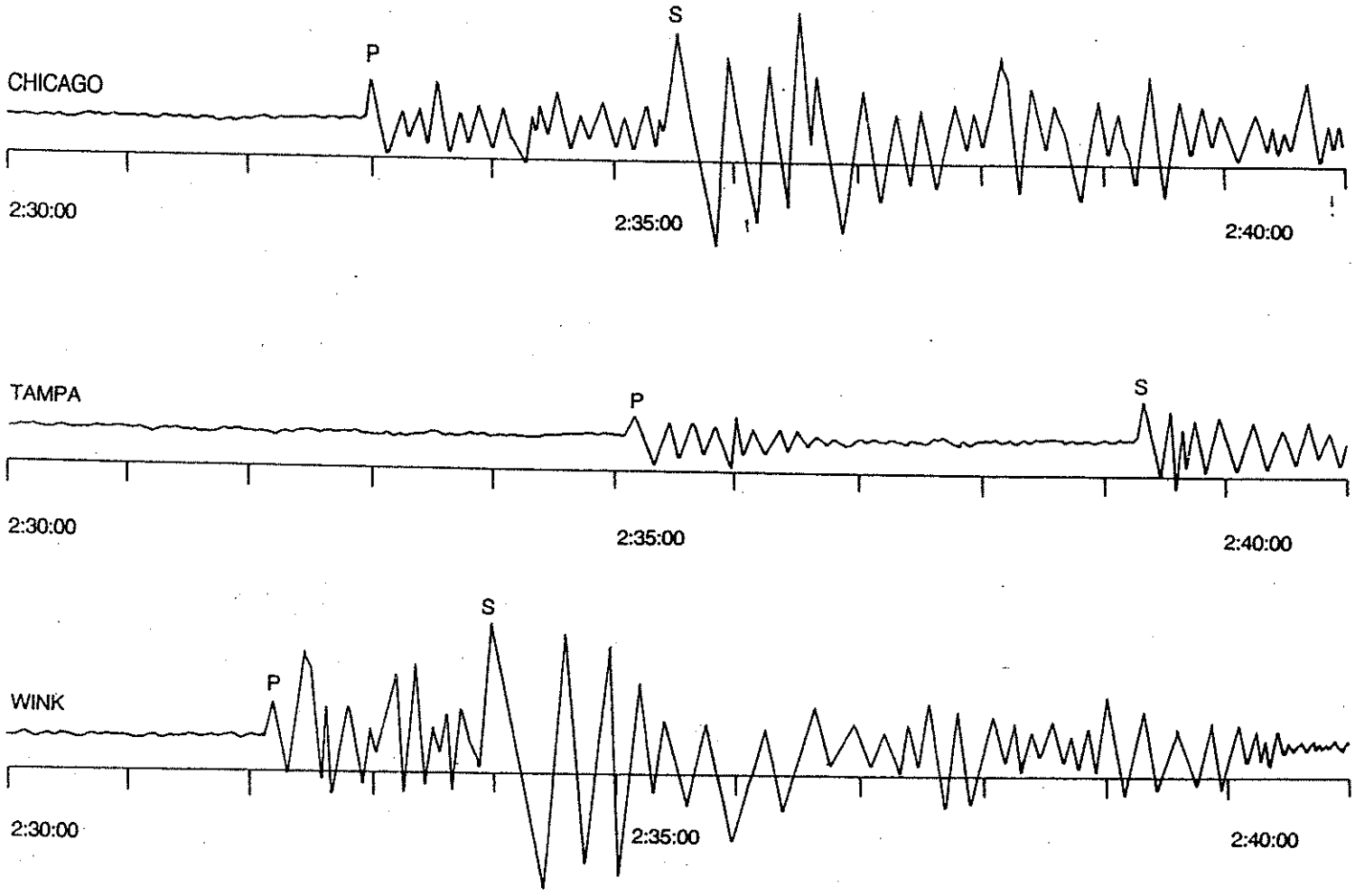
   b. Use the scale of distance of your map to set the drawing compass at the correct radius.

2. Mark and label the epicenter on the map where all three circles intersect.

FINDING EPICENTERS



SEISMOGRAMS

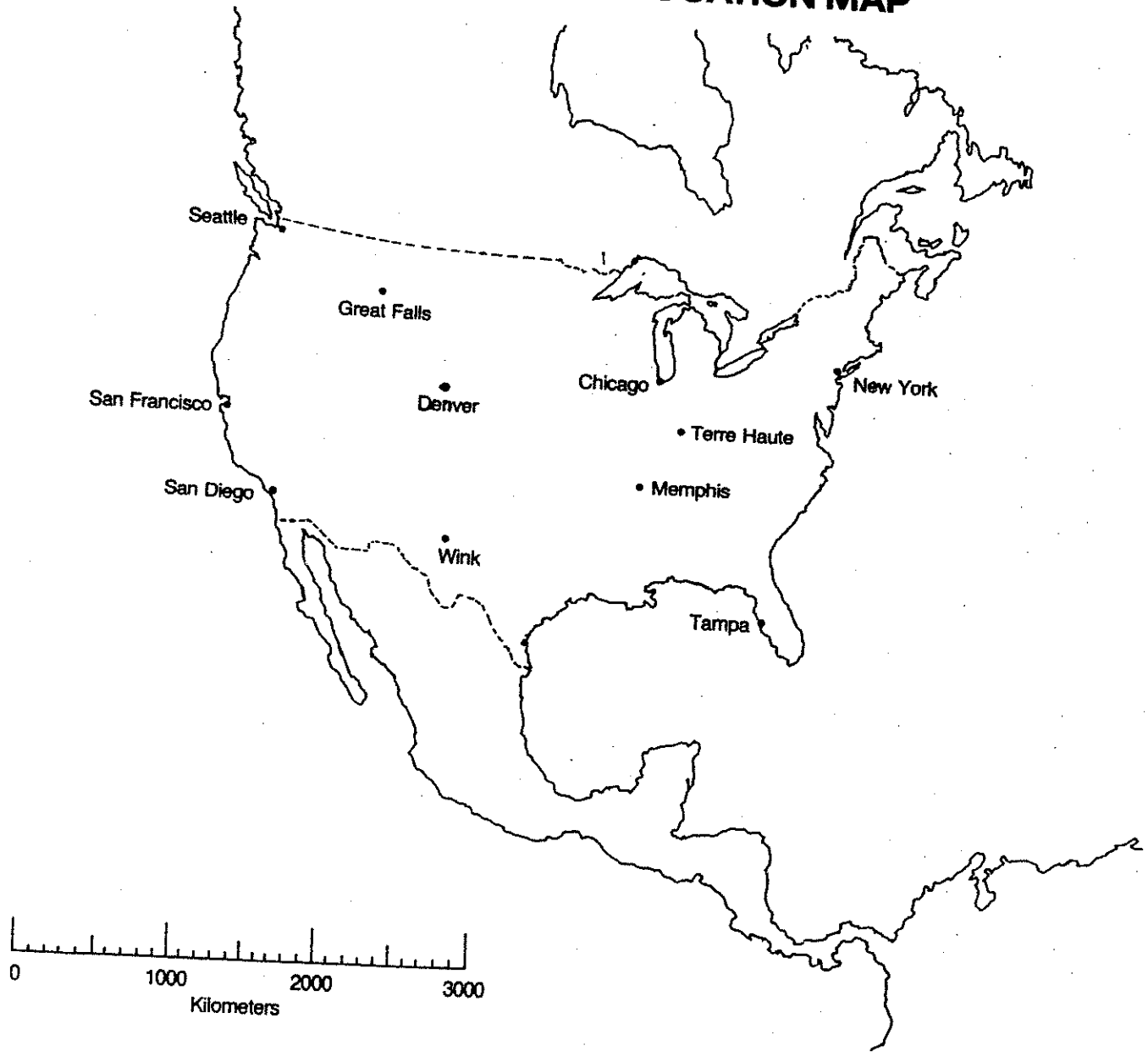


All times corrected to Greenwich Mean Time

REPORT SHEET

SEISMOGRAPH STATION	Arrival (clock time)		Difference in Arrival Time (min. and sec.)	Distance to Epicenter (km)	"P" Wave Travel Time (min. and sec.)	Time of Origin (hr., min. and sec.)
	"P" Wave	"S" Wave				
CHICAGO						
TAMPA						
WINK						

EPICENTER LOCATION MAP



DISCUSSION QUESTIONS: *(Answer in Complete Sentences)*

1. How do P-waves and S-waves differ?

2. What was the approximate location of the epicenter of this earthquake?

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.