Name _____ Date _____ Period _____

Locate the Epicenter of an Earthquake

Objectives: Using scientific methods, analyze P waves and S waves to determine the distance from seismograph recording stations to the epicenter of an earthquake. Use this information to triangulate the location of an earthquake epicenter using the distances from the three recording stations to the epicenter of the earthquake.

Procedure: Using the figure below, estimate, to the nearest tenth of a minute, the times that P-waves and S-waves first arrived at each recording station (seismograph location). Then subtract P from S to get the S-minus-P interval.

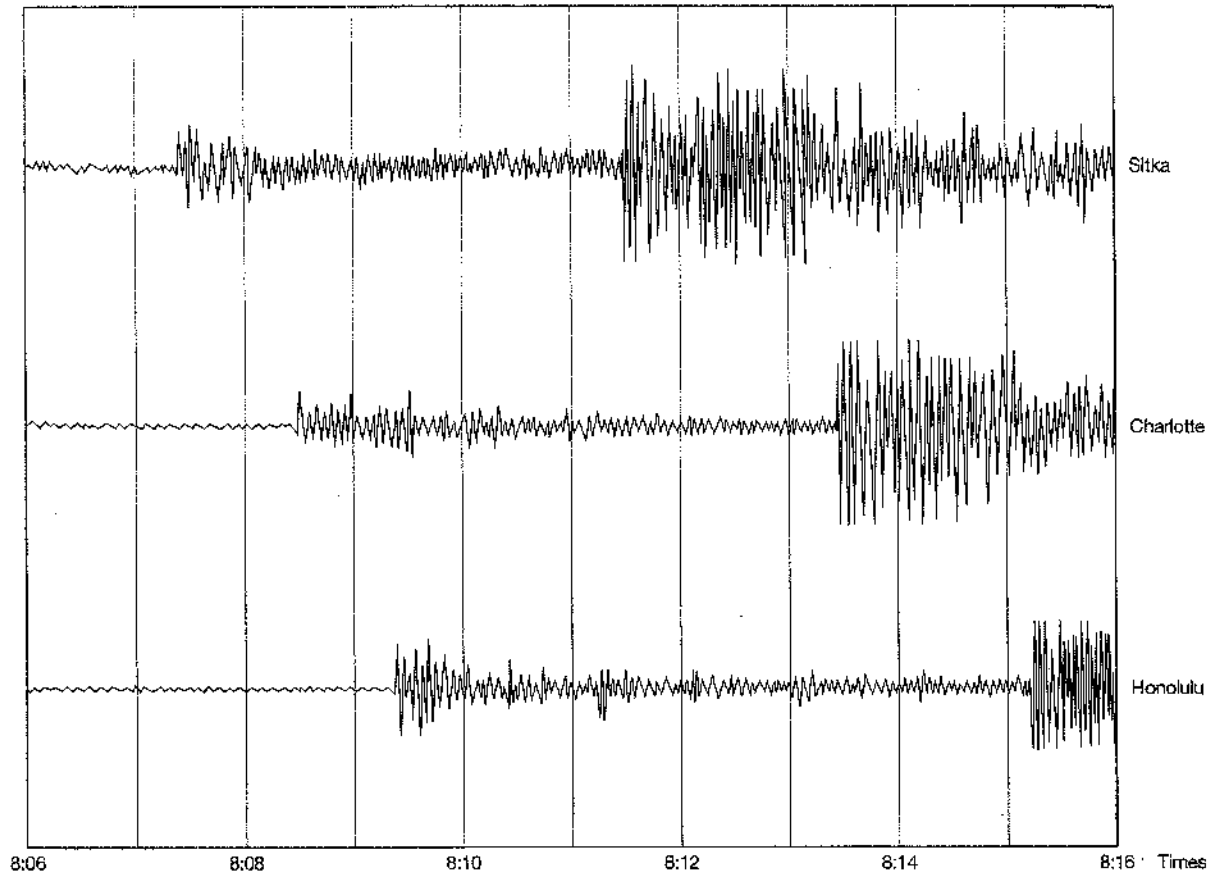
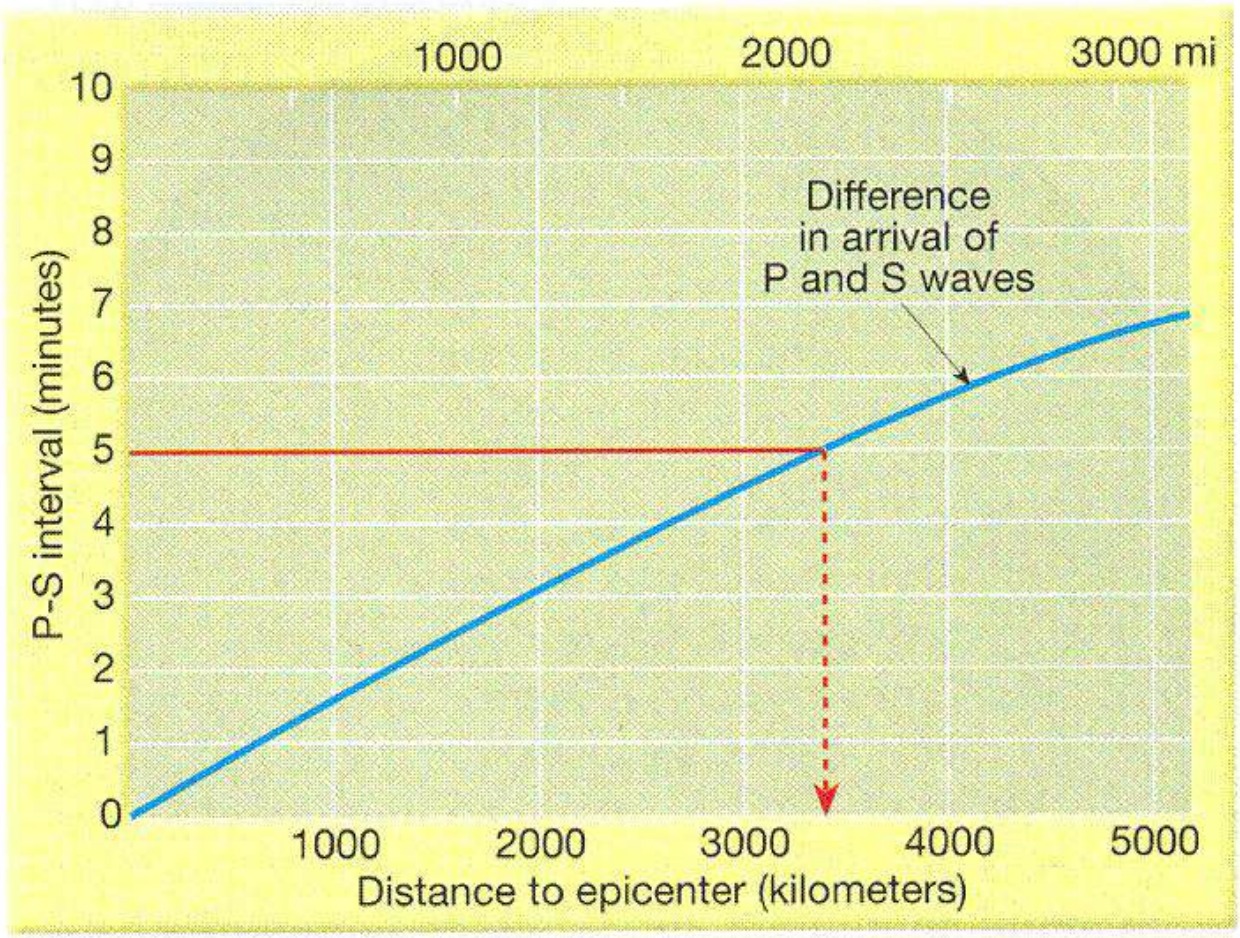


FIGURE 16.6 Seismograms for an earthquake recorded at three different locations in Alaska, North Carolina, and Hawaii. Times have been standardized to Charlotte, North Carolina, to simplify comparison.

Station	**First P Arrival**	**First S Arrival**	**S – P Interval**
Sitka, AK	_____	_____	_____
Charlotte, NC	_____	_____	_____
Honolulu, HI	_____	_____	_____

Using the calculated S – P intervals from above and the figure below, determine the distance from the epicenter (in kilometers) for each recording station.



Sitka, AK _____ kilometers

Charlotte, NC _____ kilometers

Honolulu, HI _____ kilometers

Next, find the earthquake's epicenter using the distances just obtained.

a) First use the geographic coordinates below to locate and mark the three recording stations on the world map below.

Sitka, AK: 57° N latitude, 135° W longitude

Charlotte, NC: 35° N latitude, 81° W longitude

Honolulu, HI: 21° N latitude, 158° W longitude

b) Use a drafting compass to draw a circle around each recording station. Make the radius of each circle equal to the distance from epicenter determined for each station above. (Use the scale on the map below to set this radius on your drafting compass.) The circles that you draw should intersect at approximately one point on the map. ***This point is the epicenter***. (If the three circles do not quite intersect at a single point, then find a point that is equidistant from the three edges of the circles, and use this as the epicenter.) Record the latitude and longitude of the epicenter below.

Epicenter: N Latitude _____ W Longitude _____

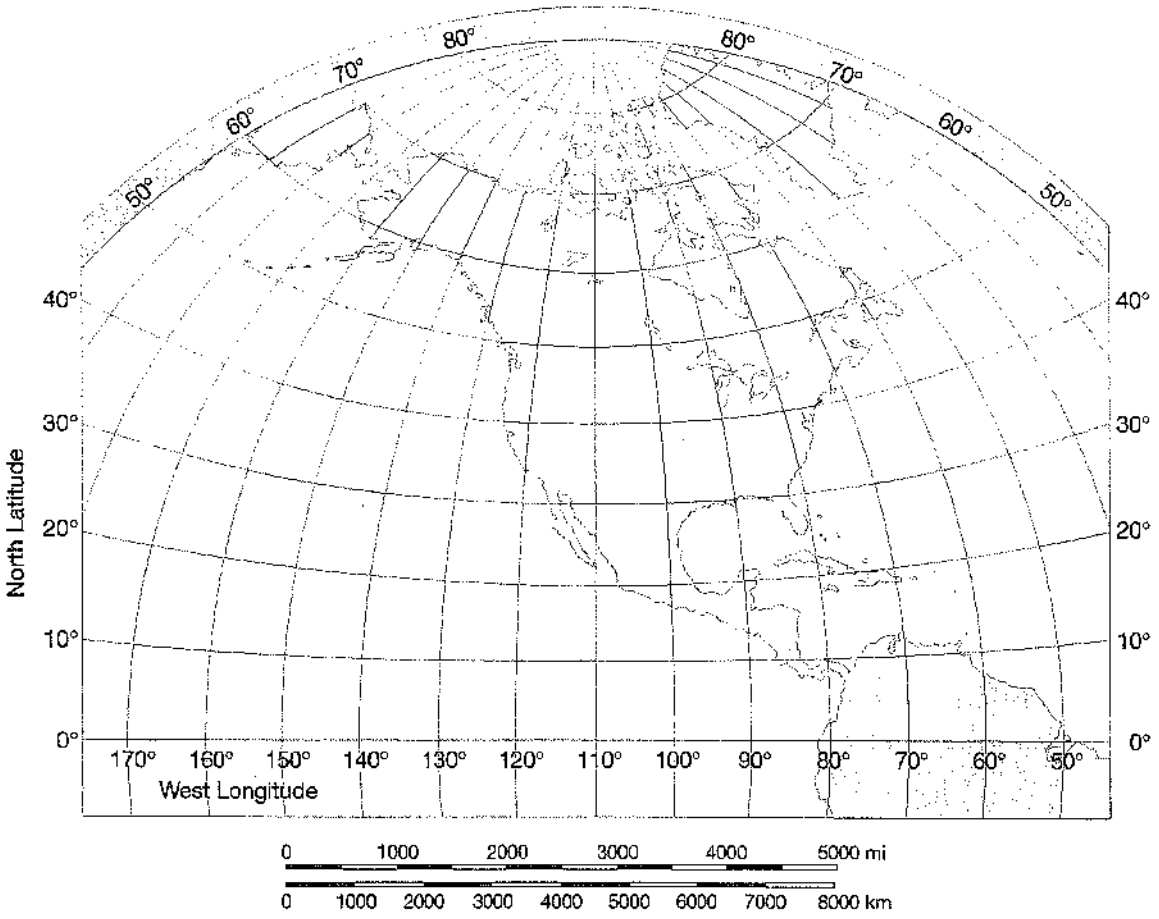
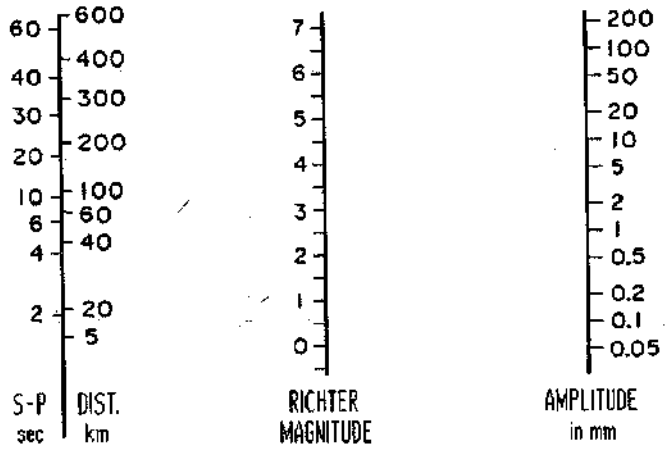


FIGURE 16.7 Map of Earth, for use in plotting data and locating the earthquake's epicenter.

Name _____

1. Imagine that we have already examined a number of seismograms, and calculated the **lag time** and **amplitude** of waves. Use the following nomograph to find the **magnitude.**



	LAG TIME (S – P)	MAGNITUDE	AMPLITUDE
(A)	2 seconds	_____	0.1 millimeter
(B)	2 seconds	_____	200 millimeters
(C)	4 seconds	_____	0.05 millimeter
(D)	20 seconds	_____	0.5 millimeter
(E)	50 seconds	_____	20 millimeters
(F)	50 seconds	_____	200 millimeters
(G)	60 seconds	_____	1 millimeter

Which of the above events was the most significant (largest)? _____

Which of the above events was the least significant (smallest effect)? _____