

Sec.: _____ Name: _____

Experiment: Locating An Earthquake
(E. Science 9-11-2c)

Purpose: To compute the distance of five different seismograph stations from a strong earthquake, and then use this information to compute the location of the epicenter of an earthquake.

Materials: compass metric ruler calculator

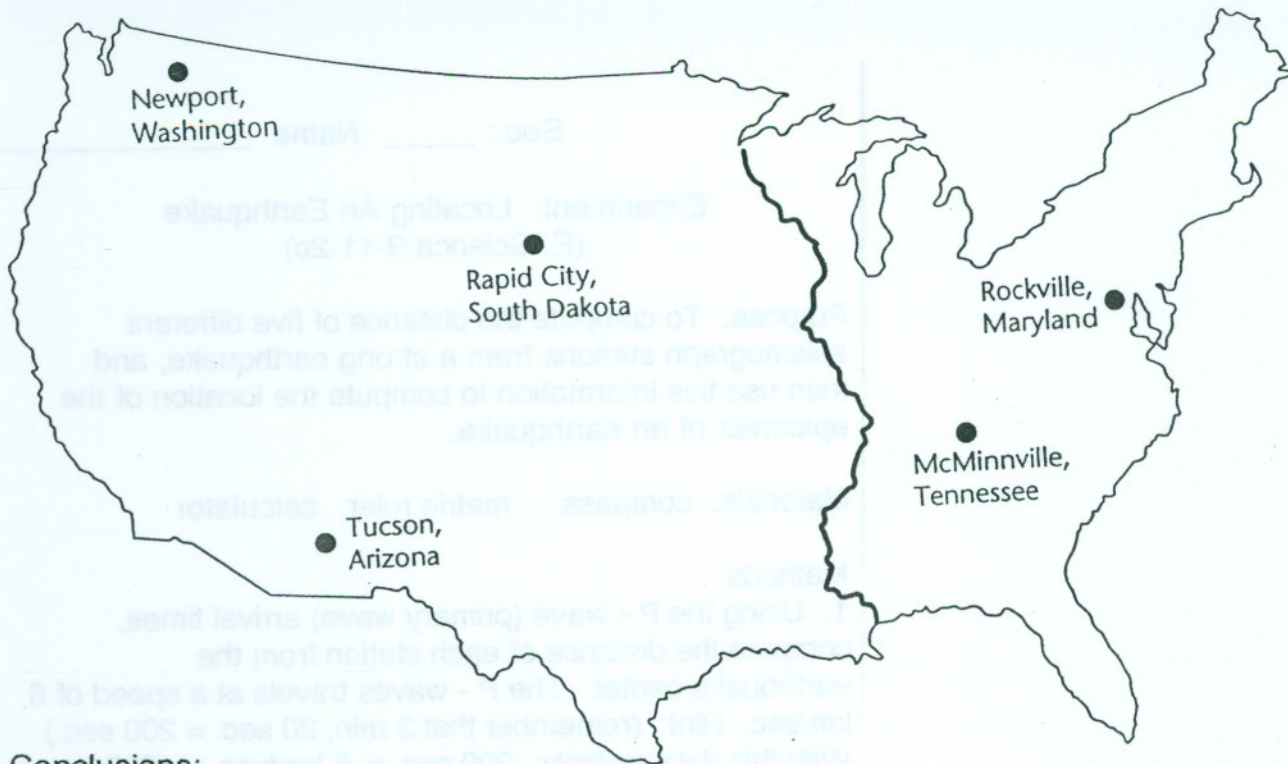
Methods:

- Using the P - wave (primary wave) arrival times, compute the distance of each station from the earthquake center. The P - waves travels at a speed of 6 km/sec. Hint: (remember that 3 min, 20 sec. = 200 sec.) With this data multiply: 200 sec. x 6 km/sec. = 1200 km. Record this in results table. Do this for each location.
 - To check the accuracy of your epicenter determination, compute the arrival times of the S - waves. The S - wave travels at one - half the speed of the P - wave. Record this in results table. (Record this in seconds.)
 - Check your distance computations using the S -wave arrival times.
 - The map scale is 2 cm = 650 km. Use the 1200 km distance of question one.

$$\frac{2 \text{ cm}}{650 \text{ km}} = \frac{x \text{ cm}}{1200 \text{ km}}$$
 thus x = 3.7 cm radius
- Record the radius for each location in results table.
- On the map in results draw an arc from each station using the computed distance as the radius of the circle.
 - Locate the epicenter of the earthquake by writing a letter "E". This is the point at which all arcs intersect (cross).

Results:	P- wave arrival time	distance from epicenter using P - wave	S - wave arrival time	distance from epicenter using S wave	radius
Rockville, MD	3 min. 20 sec.				
Newport, WA	7 min. 55 sec.				
Tucson, AZ	5 min. 50 sec.				
Rapid City, SD	3 min. 45 sec.				
McMinnville, TN	2 min. 45 sec.				

Map on reverse side.



Conclusions:

1. Record the nearest city near where the epicenter, for this lab exercise, occurred.
2. Do the figures for the S wave agree with the distances computed from the P - wave time?

Discussion: (Use figure 11 of the textbook to answer the following questions).

1. If a seismograph were located 3 000 kilometers from the earthquake's focus , how long would it take the P - wave to travel this distance?
2. How long would it take the S - wave to travel 3 000 kilometers?
3. How long (at 3 000 km) would it be after the seismograph recorded the arrival of the P - wave before the seismograph recorded the arrival of the S - wave?
4. An earthquake was recorded at three different stations, A, B, C. Use the travel - time curve (text fig. 11) to determine the distance from each station to the earthquake epicenter.

Station	Time between P wave and S wave arrival (min.)	Distance to epicenter (km)
A	2.3	
B	2.8	
C	3.0	

- 5a. What event helped the centurion, who was guarding Jesus, testify that, "Surely He was the Son of God" (Matt. 27:54)?
- 5b. Read Matt. 28:2 and record what event occurred when an angel of the Lord came down from heaven and rolled back the stone from the entrance of the tomb?
- 5c. From these two events and other events recorded in the Bible what can we conclude about God's ability to control earthquakes?