

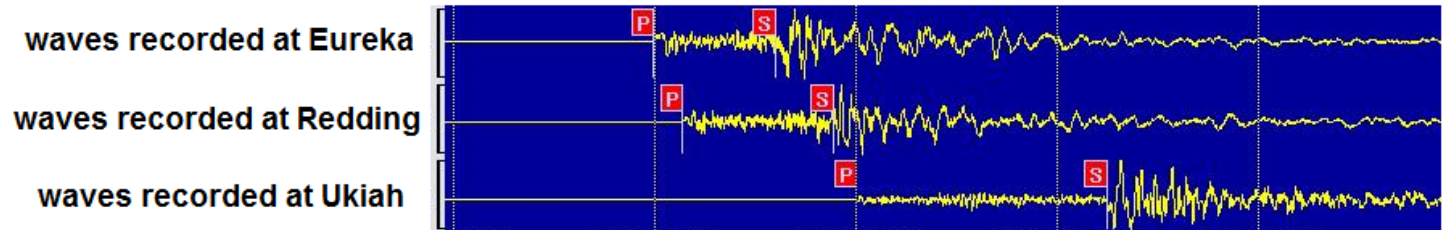
# **P+S WAVE EARTHQUAKE LAB**

name \_\_\_\_\_ /20

When an earthquake occurs, different waves are sent out starting at the focus. Earthquakes produce all three types of seismic waves: P waves, S waves, and surface waves. Because the different waves travel at different velocities, the time it takes each wave to arrive depends on the distance from the earthquake. (just like thunder and lightning; the farther away the lightning is, the longer it takes the thunder to arrive). Earthquake monitoring stations sense the waves coming in, and the first to arrive are P waves, which move at 5-8 km/sec (that's 11,180-17,888 mph!). S waves arrive second, and surface waves arrive last. View the animations at:

<https://www.mtu.edu/geo/community/seismology/learn/seismology-study/surface-wave/>

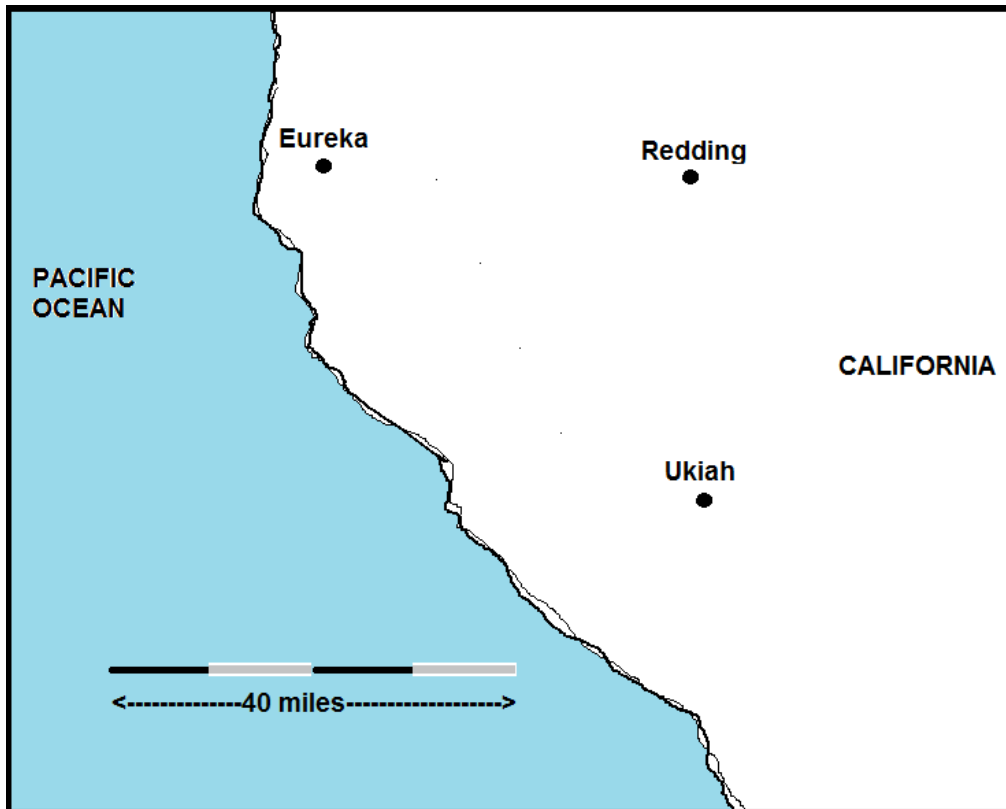
Here is a seismograph of the waves.



If you measure the time between the p wave and s wave and then multiply by 8, you can measure how far away the earthquake is in kilometers. Here is a chart that tells how many seconds passed between the arrival of the p wave and the arrival of the s wave. Calculate how far away the earthquake was from each city. (3 pts)

	Time between p wave and s wave in seconds	Distance away from earthquake in km
Eureka	1.25 seconds	
Redding	3.75 seconds	
Ukiah	5 seconds	

Now use a compass to draw a circle around each city. Use the key on the map to measure the distance on your compass. This circular line represents all the possible locations of the earthquake. The place where all circles intersect is the actual location of the earthquake. (3pts)



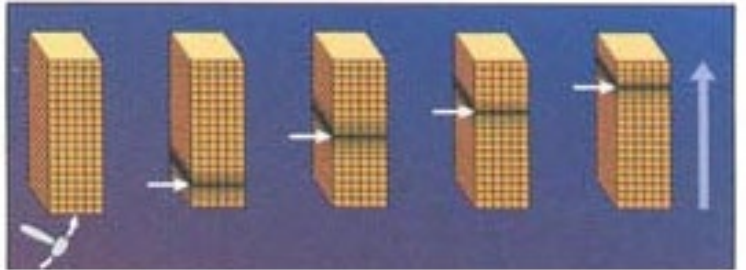
## **Analysis:**

1. In what order do earthquake waves arrive? (which is first, second, etc)
2. Given the speed of a P wave, can a seismograph station send out a warning to everyone that an earthquake with an epicenter 1000 miles away is coming?
3. Which city sensed the earthquake first?
4. Which city was furthest away from the earthquake?
5. Why did we draw circles around the cities?
6. If there were only 2 earthquake stations taking readings, could you find the exact spot of the earthquake?
7. How close could you get? (think about drawing circles around each city and finding intersections)
8. Based on the seismograph, which waves seem more destructive? (p waves or s waves?)
9. Based on the animations online, which waves are most destructive?

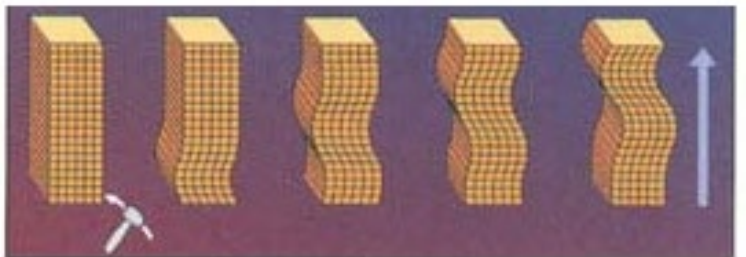
## **Matching:**

10. \_\_\_\_\_ P wave
11. \_\_\_\_\_ S wave
12. \_\_\_\_\_ Surface wave
13. \_\_\_\_\_ Which of the wave(s) in the picture are called body waves?
14. \_\_\_\_\_ Which wave travels the fastest?
15. \_\_\_\_\_ Which wave creates the most destruction? (try to imagine a building on the top of each of these pictures)

**A**



**B**



**C**

