2/4/10

Name:

Laboratory Exercise 1
Ray Paths

1. All students start from a single source point and move outward along a radial path. After 10 paces stop and observe everyone's locations. We will then take ten additional paces and observe everyone's location. What does this exercise tell us about the distribution of seismic energy as it moves away from the source?

For the next two exercises, we will break up into groups of four. Each member of the group will represent one of four waves leaving the source**: direct wave, ground roll, reflected wave, and head wave**. All four "waves" will leave the source at the same time and travel at a particular speed and path as directed by the instructor. ALL students will record the arrival time of each "wave" at each geophone until all 12 geophones have been used.

2. **Horizontal layer**. In this experiment, the "waves" will move from the surface to a horizontal/parallel layer some distance way.

Geophone	Direct Wave	Ground Roll	Reflected Wave	Head Wave
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

a. For each geophone, list the order in which the four waves arrive. In addition, sketch the ray paths from the source to geophones 4, 8 and 12

b. Plot arrival time versus distance for each "wave". Do any of the time versus distance curves fit a straight line? Do any of them not fit a straight line? Explain why they do or don't fit a straight line. Hint: Does distance traveled change by a constant amount for each geophone?

c. How would the arrival time versus distance curves be different if the distance to the horizontal/parallel surface was greater? How would the arrival time versus distance curves be different if the velocity of the "waves" in the upper medium was slower?

3. **Dipping layer**. In this experiment, the "waves" will move from the surface to a dipping/oblique layer some distance way.

Geophone	Direct Wave	Ground Roll	Reflected Wave	Head Wave
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

A. For each geophone, list the order in which the four waves arrive. In addition, sketch the ray paths from the source to geophones 4, 8 and 12

b. Plot arrival time versus distance for each "wave". Do any of the time versus distance curves fit a straight line? Do any of them not fit a straight line? Explain why they do or don't fit a straight line. Hint: Does distance traveled change by a constant amount for each geophone?

c. Without any additional information, is it possible to determine that the subsurface layer is dipping? If so, how?