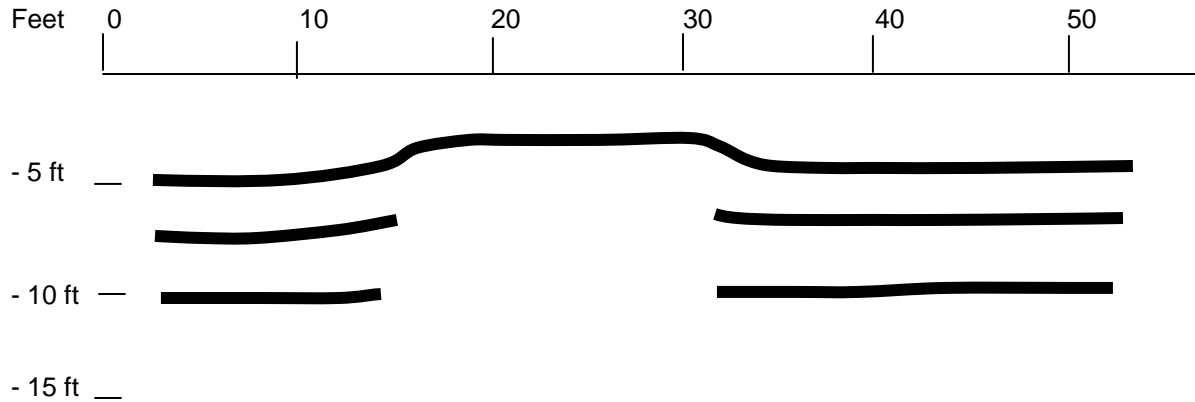


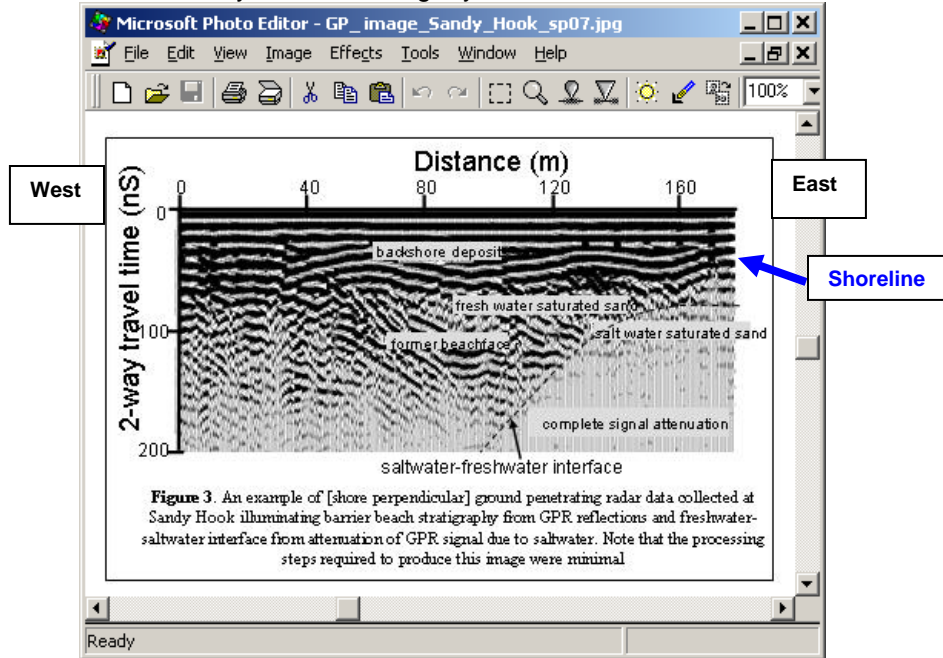
Use any resource EXCEPT EACH OTHER! By typing or signing my name above, I confirm that I have received **no help** from any of my colleagues or classmates on this exam. **Due: Thursday, Dec 18, 6 PM**

1. Below is a hypothetical ground penetrating radar profile that was run over an area that is believed to contain an underground storage tank. The lines indicate the "mark" points along the profile. **Where** do you suspect that the tank is located, and **why?** (10 pts)



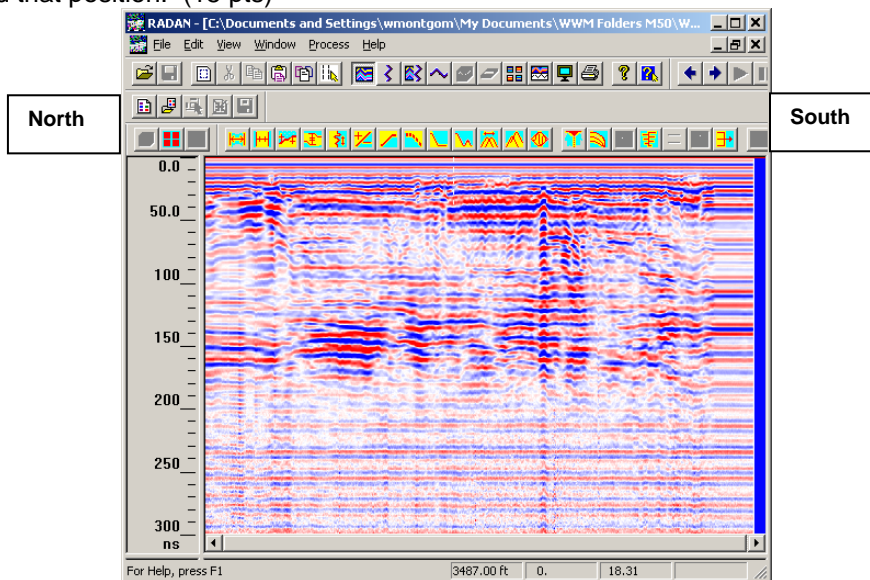
2. Draw or acquire a picture showing GPR ray paths and use it to explain why a point source gives a hyperbolic reflection when viewed on a GPR line that has a vertical axis scaled in time. Use your own words for full credit! (15 pts)

3. Below is an image of a radar line taken by Lee Slater that was taken near - and perpendicular to - the shoreline at Sandy Hook, showing dry sand, freshwater sand, and saltwater sand:

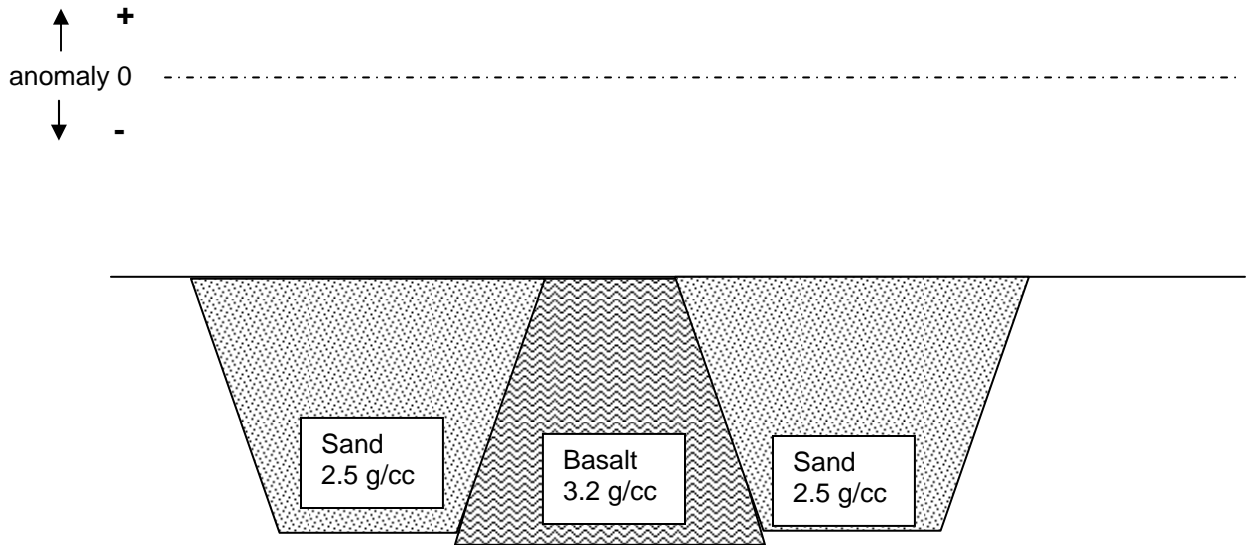


Explain **WHY** the GPR signal is completely attenuated once it encounters saltwater sand (10 pts)

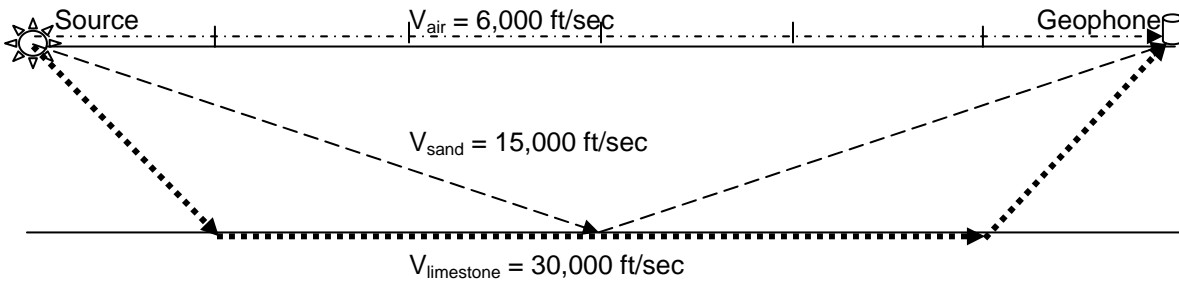
4. Below is a shore-parallel GPR taken by Bill Montgomery's class approximately 100 meters inland of the shoreline at Sandy Hook, with the vertical scale in 2-way travel time (nS). Show where you think the freshwater sand/saltwater sand interface is located in 2-way travel time, and explain **WHY** you picked that position. (15 pts)



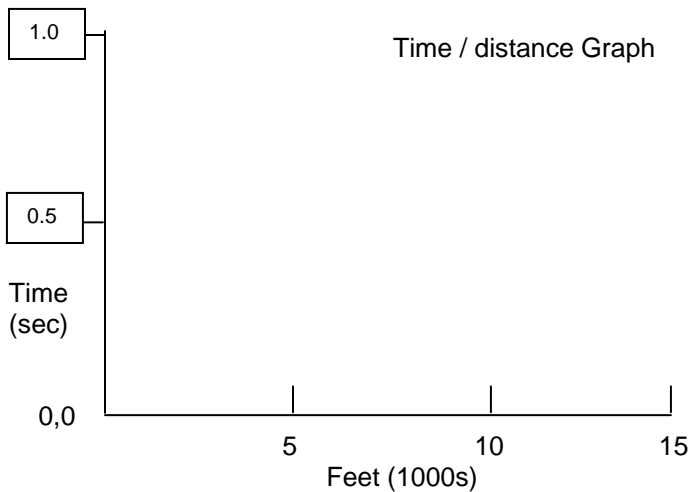
5. Plot a generalized gravity profile you would expect to see above the geological scenario pictured below (a buried, basalt-filled rift valley flanked by troughs filled with sand): (10 pts)



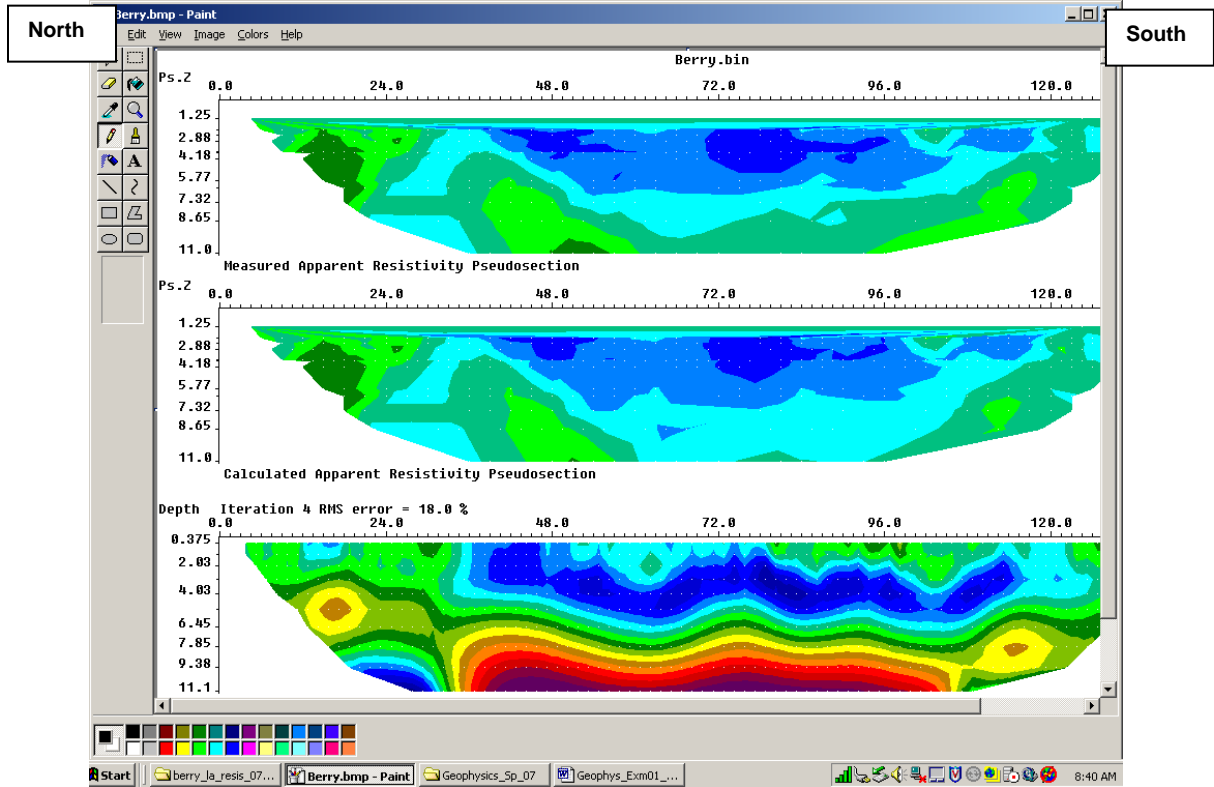
6. Diagrammed below, to scale, are 3 hypothetical travel paths from a seismic source to a geophone. Determine the time that it takes for the signal to travel to the geophone along each path, and plot the arrival times at the geophone on the time / distance graph below. (20 pts)



SCALE 1" = 1000 feet, horizontal and vertical



7. Below (bottom profile) is a North-South calculated resistivity “pseudo-section” of the subsurface at Berry Lane in Jersey City, NJ taken by Dr. Lee Slater. Vertical and horizontal units are both in meters (3.3 ft/m). Low resistivity is shown in cool colors such as deep blue, while high resistivity is shown in red and purple. This line was run parallel to, and within 50-100 feet of, the old Morris Canal. Ground level in this area of Jersey City is about 15 feet above sea level. This area has an industrial history, and could be the site of historic fill, some of which contains metal.



- Is the conductivity of the blue layer high, or low? (5 pts)
- Speculate as to the cause of the low-resistivity response of the blue layer. (5 pts)
- Lay out a plan for a complete geological-geophysical investigation in order to conclusively determine subsurface materials and stratigraphy in this area. NOTE: This is a real-life, future project in which YOU might want to be involved! (10 pts)

BONUS: The movie best capturing the spirit and culture of the scuttled Sp07 “GPR the Urn” project was:

- Ferris Buehler’s Day Off
- Star Wars
- Ghostbusters
- Deliverance

/20+5