

Geology 437; First Exam Fall, 1996. Who are you? _____

1. Give concise, accurate, neat, geophysically relevant definitions or explanations for the following:

a). Paleosecular variation

b). Paleomagnetic Euler pole.

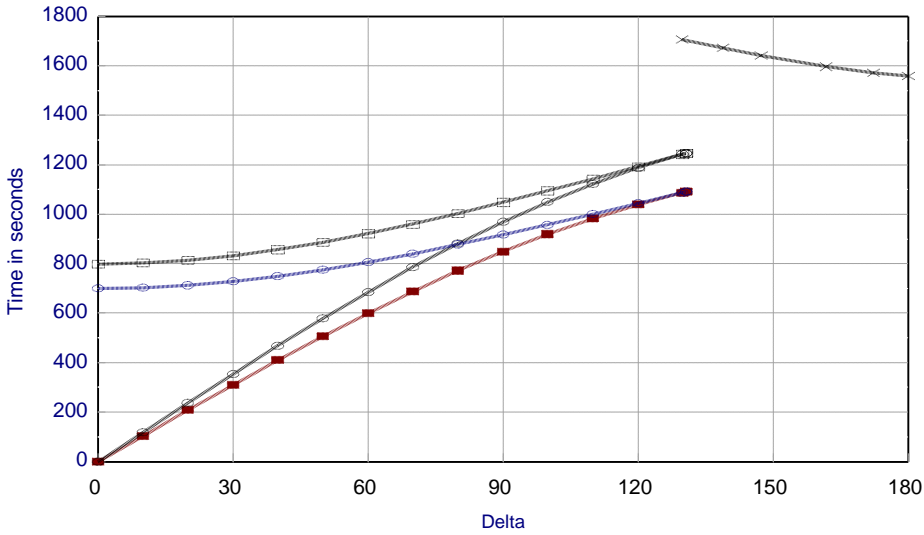
c). Primary versus secondary magnetization

d). Head wave (critically refracted wave)

e). Shadow zone

f). Seismic gap

2. Use this T-delta chart to answer the following questions. Remember that PcP and ScS are reflections off the core, P, S are direct waves, PkP is a refraction through the outer core. Assume mantle P-waves travel at 8 km/sec and the core radius is 2000 kilometers.



Mantle thickness is: _____

V_p in the core is: _____

V_s in the mantle is: _____

On the T-delta diagram, **accurately** sketch the arrival time curve of a P -wave that traveled directly along the surface (not refracted through the mantle).

3. A moderately dipping normal fault outcrops at the surface and you want to know how its dip changes with depth. You collect data on three seismic refraction lines **parallel** to the strike of the fault.

Refraction line #1 is 1,000 meters west of the scarp and for both forward and reverse shots gives:

<u>Distance</u>	<u>Direct wave</u>	<u>Refracted wave</u>
0 meters	0 seconds	.6142 seconds
250	.125	.6767
500	.250	.7392
1000	.500	.8642

V1 = _____

V2 = _____

Distance to the fault surface=: _____

Refraction line #2 is 5 km west of the scarp, yields symmetric forward and reverse data, and the same velocities as above. The intercept time for the refracted ray is: **3.06 seconds**.

Now the distance to the fault surface is _____

Refraction line #3 is 8 km west of the scarp, yields symmetric forward and reverse data, and the same velocities as above. The data, in time - distance space, cross at **17.32 kilometers**.

Now the distance to the fault surface is _____

(question continues on next page)

Think about the previous seismic data and your interpretation. Then **neatly** and **accurately** sketch a cross section for the most likely shape of the fault - label your axes and provide the correct numbers. Explain and justify your reasoning.

4.) You have nicely-behaved paleomagnetic samples from some Cambrian siltstones; their expected declination is directly southwest (225°) with a shallow (-10°) inclination.

a) Suppose the rocks are flat lying and have a present-day viscous remanent magnetization (VRM) partially overprinting primary detrital remanence (DRM). How do you expect the natural remanent (NRM) directions to change as you successfully clean away the VRM? Provide a sketch.

b) Suppose the rocks are folded. How would the VRM and primary DRM differ in their behavior as you rotated the beds back to paleohorizontal (on a stereonet)? What does this tell you about the age of the magnetizations?

5). The apparent polar wander path to the right goes with the funny shaped continent and the following questions. The age of the poles increases with the numbers (4 is older than 3):

a) What did the continent do from 0 to 3 and where was its Euler pole during this time?

b) What did the continent do from 3 to 6 and where was its Euler pole during this time?

6) Plate A is obliquely subducted beneath plate B at 5 mm/year. B moves southwest (225°) relative to A. Plates B and C share a transform margin; B moves SE (135°) at 7mm/year relative to C.

a. Calculate plate A's motion relative to Plate C.

b. What is the nature of the margin between A and C?