

**Geology 437 – Seismology and Magnetics; shaking off the summer doldrums. Let’s talk about these Monday, September 9.**

1. If the Pacific plate is moving 7.2 cm/year on an azimuth of  $-23^\circ$  from geographic north (west is positive), what are its north and east components of velocity in km/ma? (assume a 2D surface)
2. What is the volume of Earth’s mantle in  $\text{km}^3$ ?
3. Pressure at depth is approximately:

$$\int_0^z \rho g \, dz$$

Where  $\rho$  is density,  $g$  is the acceleration of gravity, and  $z$  is depth. What is the pressure at 17.5 kilometers in GPa ( $1 \text{ GPa} = 10^9 \text{ Pa} = 10^9 \text{ N/m}^2$ ) and kilobars ( $1 \text{ kbar} = 10^8 \text{ Pa}$ )? Keep your units straight.

Construct a graph of pressure in the crust, to a depth of 35 kilometers, assuming density and gravity are constant over that range.

4. Consider the temperature/depth data in the table and provide your best estimate of temperature for the blanks. Explain how you made your estimates.

Depth (km)	Temperature ( $^\circ\text{C}$ )
.2	6
.5	16
1	27
3	
5	135
12	287
17	
20	441
35	

5. If the internal angle (measured at the center of Earth) between two points on the surface is  $35^\circ$ , what is the distance (km) between the two points for somebody travelling on the surface? Use a radius of 6,371 kilometers.
6. About how long (in seconds) would it take a P-wave travelling along the surface (6 km/s) to reach Missoula from Yellowstone National Park? How about one covering the same distance in the mantle at 8 km/s?