Geology 437 – Seismology and Magnetics; shaking off the summer doldrums. Let's talk about these Wednesday, August 30.

1. If the Pacific plate is moving 6.9 cm/ year on an azimuth of -42^{o} 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 km^3?

3. Pressure at depth is approximately:

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

   Where p is density, g is the acceleration of gravity, and z is depth. What is the pressure at 22 kilometers in GPa (1 GPa = 10^9 Pa = 10^9 N/m^2) and kilobars (1 kbar = 10^8 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. First, think about how you expect temperature to increase with depth. Next, consider the temperature/depth data in the table and provide your best estimate of temperature for the blanks. Use Excel, or other software, and explain how you made your estimates.

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

5. Missoula is at a latitude of about 47^{o}. What is the shortest distance to the equator if you travel on the surface? Use a radius of 6,371 kilometers, the radius of a sphere with volume equal to Earth's. So, how many kilometers per great circle degree on Earth?

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?