Physics 1
Density and Pressure
Problem Set 1

1. A box weighs 70 kg and is 1 meter by 2.5 meters on the bottom side. What is the pressure it exerts on the floor?

2. The floor in our classroom has an area of approximately 3 meters by 5 meters. If the pressure of air at sea level is approximately $1.013x10^5 N/m^2$ what is the force exerted on the floor by the air in the classroom.

3. A lead cube ($\rho = 11,300 \ ^{kg}/_{m^3}$) has a mass of 30 kg. What is the volume of the cube?

4. A rectangular cylindrical rod made of aluminum has a length of 0.62 m, a width of 0.40 m and a height of 1.2 m. If the density of aluminum is 2700 kg/m^3, what is the mass of the rod?

5. What volume would 5 kg of water take up if the density of water is 1000 kg/m^3?

6. A uniform solid metal sphere has a radius of 0.045 m and a mass of 4.5 kg, what is the density of the object ($V_{sphere} = \frac{4}{3}\pi r^3$)?

7. If you apply a force of 50 N to an area 2 cm by 4 cm, what is the pressure you apply?

8. Using the equation for pressure, explain why you can pop a balloon with a needle as opposed to your thumb.