

INS Physics Workshop 1, due April 7

1. Estimate your volume in cm^3 and in liters.
2. As we saw in class, ice (frozen water) does not float in ethyl alcohol, density 0.79 gm/cm^3 . Use Archimede's Principle to explain this.
3. A barge filled high with sand approaches a low bridge and can not quite pass under the bridge. Should additional sand be put on top of the sand pile or should sand from the top of the pile be removed from the barge? The density of sand is greater than the density of water.
4. Calculate how many cm^3 are in 1 m^3 .
5. Archimedes' principle can be used to determine the density of an unknown liquid using a known solid. For example, a 3.40-kg aluminum ball has an apparent mass of 2.10-kg when submerged in a particular liquid. The density of aluminum is 2.70 gm/cm^3 . Calculate the density of the liquid.
6. The gauge pressure in each of the four tires of an automobile is 240 kPa. If each tire has a "footprint" of 200 cm^2 , estimate the mass of the car.
7. Estimate the mass of the Earth's atmosphere using the known value of atmospheric pressure at sea level.
8. After winning the mega-lottery, you are sitting on the deck of your boat that is floating in the pool in your backyard.
 - a. You drop some ice from your drink into the pool. Does the water level in the pool go up, go down, or stay the same?
 - b.. You drop a glass into the pool. Does the water level in the pool go up, go down, or stay the same?