Buoyancy Problem Set

1) A stone weighs 105 lb in air. When submerged in water, it weighs 67.0 lb. Find the volume and specific gravity of the stone. (Specific gravity of an object: ratio object density to water density)

2) A standard basketball (mass = 624 grams; 24.3 cm in diameter) is held fully under water. Calculate the buoyant force and weight.
   a. When released, does the ball sink to the bottom or float to the surface?
   b. If it floats, what percentage of it is sticking out of the water?
   c. If it sinks, what is the normal force, F_N with which it sits on the bottom of the pool?

3) . Water ice has a density of 0.91 g/cm³, so it will float in liquid water. Imagine you have a cube of ice, 10 cm on a side.
   a. What is the cube's weight?
   b. What volume of liquid water must be displaced in order to support the floating cube?
   c. How much of the cube is under the surface of the water?

4) A steel cable holds a 120-kg shark tank 3 meters below the surface of saltwater. If the volume of water displaced by the shark tank is 0.1 m³, what is the tension in the cable? Assume the density of saltwater is 1025 kg/m³.

5) You have a block of a mystery material, 12 cm long, 11 cm wide and 3.5 cm thick. Its mass is 1155 grams.
   a. Will it float in a tank of water, or sink? Explain your reason
   b. If it floats: What percentage of the object will be sticking above the water?
      If it sinks, what will be the normal force it causes on the bottom of the tank?