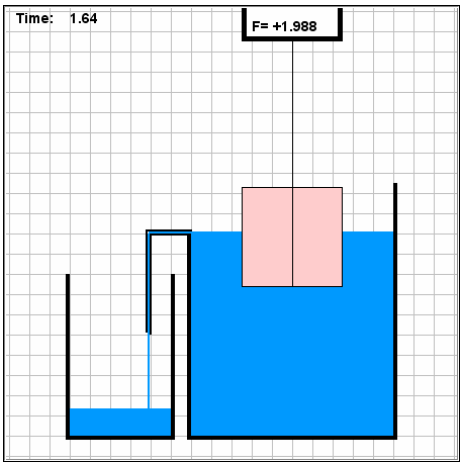
Worksheet for Exploration 14.2: Buoyant Force



When an object is put into a liquid, it experiences a buoyant force that is equal to the weight of the liquid the object displaces. The force on the wire is given as the block is slowly lowered into the liquid **(position is given in centimeters and force is given in newtons)**. You can change the mass of the block between 0.125 kg and 0.375 kg and the density of the liquid between 500 kg/m^3 and 1000 kg/m^3. The object is in static equilibrium when the clock stops. Restart.

a. What is the weight of the block and the tension in the string when the block is in the liquid? Therefore, what is the value of the buoyant force? The buoyant force and the tension in the string (the force on the support wire) act upward and the weight acts down.

   i. First sketch a free body force diagram for forces acting on the reshaped box. (One of these is the buoyant force).

$F_{g\ block\ submersed}$=_____

$F_{Tension}$=_____

b. What is the volume of the block in the liquid—either the submerged part of the block if the block is partially submerged when you paused it or the entire block if it is completely submerged **(the dimension of the block that is into the screen is 5 cm)**?

Length=_____ Width=_____ Depth=_____

Volume Block=_____

c. What is the volume of the water that is displaced by the block **(the dimension of both water containers into the screen is 10 cm)**? Verify that this is equal to the answer in (b).

Length=_____ Width=_____ Depth=_____

Volume displaced water=_____

d. What is the mass of the liquid displaced? What is the weight of the liquid displaced? Check that this is equal to the buoyant force.

mass liquid=_____

e. Pick two different masses and densities and verify that the buoyant force is equal to the weight of the water displaced.

i. mass=_____ Density=_____

$F_{buoyant}$=_____ F_g=_____

ii. mass=_____ Density=_____

$F_{buoyant}$=_____ F_g=_____