AP 2 Fluids WS 6

Come ti chiami? _____

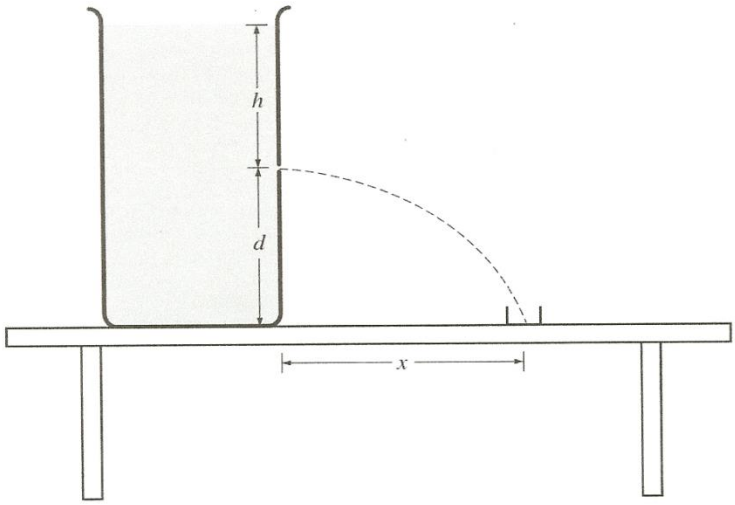
"Chemistry is the dirty part of Physics."
– Peter Reiss

1. Could you use a straw to sip a drink on the moon? Explain

2. On a distant planet the acceleration due to gravity is less than it is on earth. Would you float more easily in water on this planet than on earth? Explain.

3. A person who weighs 635 N is riding a 98 N mountain bike. Suppose the entire weight of the rider and bike is supported equally by the two tires. If the gauge pressure in each tire is 7.6×10^5 Pa, what is the area of contact between each tire and the ground?

4.



4. (10 points)

The large container shown in the cross section above is filled with a liquid of density 1.1×10^3 kg/m^3. A small hole of area 2.5×10^{-6} m^2 is opened in the side of the container a distance h below the liquid surface, which allows a stream of liquid to flow through the hole and into a beaker placed to the right of the container. At the same time, liquid is also added to the container at an appropriate rate so that h remains constant. The amount of liquid collected in the beaker in 2.0 minutes is 7.2×10^{-4} m^3.

(a) Calculate the volume rate of flow of liquid from the hole in m^3/s.

(b) Calculate the speed of the liquid as it exits from the hole.

(c) Calculate the height h of liquid needed above the hole to cause the speed you determined in part (b).

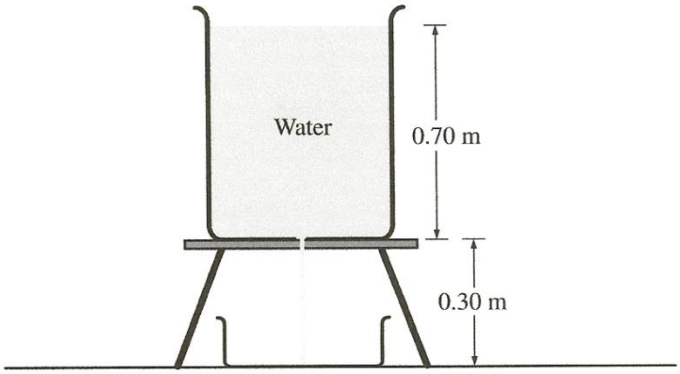
(d) Suppose that there is now less liquid in the beaker so that the height h is reduced to $h/2$. In relation to the beaker, where will the liquid hit the tabletop?

____ Left of the beaker ____ In the beaker ____ Right of the beaker

Justify your answer.

should say "container"

5.



(10 points)

A cylindrical tank containing water of density 1000 kg/m^3 is filled to a height of 0.70 m and placed on a stand as shown in the cross section above. A hole of radius 0.0010 m in the bottom of the tank is opened. Water then flows through the hole and through an opening in the stand and is collected in a tray 0.30 m below the hole. At the same time, water is added to the tank at an appropriate rate so that the water level in the tank remains constant.

(a) Calculate the speed at which the water flows out from the hole.

(b) Calculate the volume rate at which water flows out from the hole.

(c) Calculate the volume of water collected in the tray in $t = 2.0$ minutes.

(d) Calculate the time it takes for a given droplet of water to fall 0.25 m from the hole.