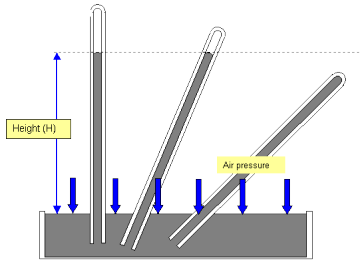


- 7) Say you have 2 cubes where the sides of each cube are equal. One has sides that are 1 cm^3 long and the other has sides that are 5 cm^3 long.
- How much more length does each side of the 5 cm^3 cube have?
 - How much more area does each side of the 5 cm^3 cube have?
 - How much more total surface area does the 5 cm^3 cube have?
 - How much more volume does the 5 cm^3 cube have?
 - What is the surface area to volume ratio of each cube?
 - What will happen to the surface area to volume ratio of a cube as it increases in volume? Prove your answer.
 - If both items were ice cubes which would melt faster? Why?
- 8) What is the difference between weight density and mass density? What are the units of each?
- 9) Why does liquid density not depend on the volume of the liquid?
- 10) What does it mean for an object to be *immersed*?
- 11) The buoyant force on an immersed object all depends on what weight?

- 12) Is the buoyant force different on an object that floats versus an object that sinks? Explain.
- 13) Say you accidentally dropped your cell phone in a large 0.5 L glass full of water (hopefully you have insurance) and 55 mL of water spills out of the glass. Assume the phone's mass is 112 g and has a volume of 55 cm³.
- What is the volume of the phone?
 - What is the density of the phone?
 - What is the mass of the water spilt?
 - What is the weight of the water spilt?
 - Will the phone sink? Prove your answer
- 14) If an object floats, you can be certain that the fluid it displaces is equal to what?
- 15) Besides being different in value, what is the difference between the density of the ocean and the density of the atmosphere? Why is this?
- 16) An empty room has a 200 m² floor and a 4 meter high ceiling?
- How much is the mass of the air in the room?
 - How much is the weight of the air in the room?

17) Explain why a simple mercury barometer will always reach the same height no matter what angle the barometer is placed at? (see the image below)



18) If you squeeze a balloon to $1/4$ its volume, by how much will the pressure increase?

19) How is Boyle's law an application of the law of conservation of energy?

20) What exactly is the pressure mentioned in Bernoulli's principle? (if you answer, "fluid pressure," that's not specific enough; a drawing might help).

21) Explain why Bernoulli's principle is true by using the law of conservation of energy?

22) Will a water hose break down faster if water moves through quickly or slowly? Explain.

23) How many newtons of lift are exerted on the wings of an airplane that have a total area of 100 m^2 when the difference in air pressure below and above the wings is 5% of atmospheric pressure? Assuming the airplane is $1.6 \times 10^5 \text{ N}$, will it fly?