HW 1.2 Chapter 5 → #6-10, 11, 13, 41, 62, 83, 90, 94

6) The value for the absolute pressure will always be greater than that for gage pressure.

- False, gage pressure uses atmospheric pressure as 0

7) As long as you stay on the surface of earth, the atmosphere pressure will be 14.7 psia.

- True, the atmospheric pressure is what's on our shoulders, it's the same everywhere on earth.

8) The pressure in a certain tank is -53.6 Pa(abs)

- False, absolute pressure cannot be zero

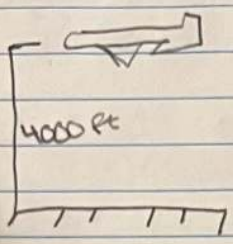
9) The pressure in a certain tank is -4.65 psig

- True, the tank is suctioned

10) The pressure in a certain tank is -175 kpa (gage)

- False, the pressure in the tank can't be 0 kpa absolute pressure.

11) If you were in a ride in an open cockpit airplane to an elevation of 4000 ft above sea level what would the atmospheric pressure be if it conforms to the standard atmosphere.



$\Delta P = \gamma h$

$= (.0764 \frac{lb}{ft^3})(4,000 ft)$

$= 305.6 \frac{lb}{ft^2}$

$= (305.6 \frac{lb}{ft^2})(\frac{1 ft}{12 in})^2$

$= 2.122$

$P_{atm} - \Delta P = P$

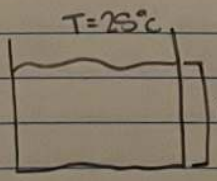
↳ $14.7 psi - 2.122 psi =$

$= 12.5 psi$

13) Expressed as a gage pressure, what is the pressure @ the surface of the milk.

The pressure is 0 gage

41) For the tank of ethylene glycol described in (3-46) Compute the pressure @ a depth of 12.0m.



$\gamma = 10.79 \frac{kN}{m^3}$ at 25°c

$\Delta P = \gamma h$

$\Delta P = (10.79 \frac{kN}{m^3})\ 12m$

$\Delta P = (129.48 \frac{kN}{m^2})(\frac{1000 N}{1 kN})(\frac{1 kPa}{1000 Pa})$

$P = 129.48 kPa$

62) Water is drawn in a pipe, calculate pressure at point A in KPA (Gage)

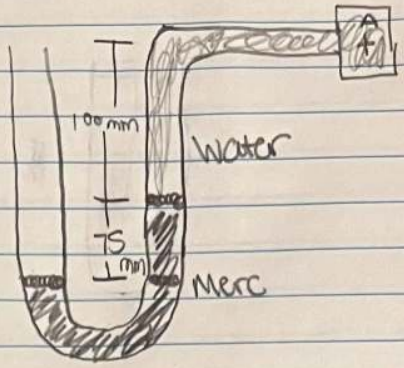
$$S_g = \gamma_{Hg}/\gamma_{H_2O} = \rho_{Hg}/\rho_{H_2O}$$

$$13.54 = \gamma_{Hg}/\gamma_{H_2O}$$

$$\gamma_{H_2O} \cdot 13.54 = \gamma_{Hg}$$

$$(9.81)(13.54) =$$

$$\gamma_{Hg} = 132.83 \text{ kN/m}^3$$



$$P_A = P_{atm} - \gamma_{Hg}(x_1) - \gamma_{H_2O}(x_2)$$

$$P_A = 101 \text{ kPa} - (132.\text{kN/m}^3)(0.075\text{m})$$

$$P_A = 101 \text{ kPa} - 9.962 \text{ kN/m}^2 - .981 \text{ kN/m}^2 \quad (-9.81(0.1))$$

$$P_A = 101 \text{ kPa} - 8.981 \text{ kN/m}^2$$

$$\boxed{P_A = 92.019 \text{ KPA}}$$

$$(75\text{mm})\left(\frac{1\text{m}}{1000\text{mm}}\right) = 0.075\text{m}$$

$$(100\text{ mm})\left(\frac{1\text{m}}{1000\text{mm}}\right) = .1\text{m}$$

83) A barometer indicates the atmosphere pressure to be 30.65 in of merc. Calculate pressure in psia.

1 inch merc = 0.49 psia

$P = Phg(.49)$

$P = 30.65(.49)$

$\boxed{P = 15.01 \text{ psia}}$

96) The pressure in a vaccum chamber is -68.2 kpa Express the pressure in mmHg.

1 Pa = 0.0075 mmHg

$-68200 \text{ Pa} = -68200(.0075)$

$\boxed{= -511.5 \text{ mmHg}}$

99) A passive solar water heater is to be installed on the roof of a multistory building. The heater tank is open to the atmospheric pressure + is mounted 16m above ground level. In the static state, what gage pressure in kpa must the plumbing line be designed to with stand if it is connected all the way down to ground level?

$h = 16\text{m}$

$\Delta P = \rho h$

$\Delta P = 9.81(16\text{m})$

$\boxed{\Delta P = 156.96 \text{ kPa}}$