Homework 1.2 Fluids

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THE GROUP

1.) Solved problems reflection

I learned that Pressure is just how often the molecules in a fluid are hitting the walls of the vessel they are contained inside. This can be calculated by putting the force of the fluid over the area it is in contact with. Compressibility is another concept that we learned. It is the percent change of a fluid's volume under a pressure load. However, in this course we will mainly be working with incompressible fluids.
At the same elevation in a stagnant fluid, the pressure is the same, but increases further down and decreases further up. This can be found by multiplying the height from the surface of the fluid by the specific weight of the fluid.
Another important thing I learned in class was about manometers. When one side goes up, the other side goes down by the same amount. The deflection is measured between the two new heights, not against the original height of the fluid.

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2.)

3.6.) True. Absolute pressure is equal to gage pressure added to atmospheric pressure. Even if $P_{atm} = 0$ then the absolute pressure will at least be equal to the gage pressure.

3.7.) False. At sea level it is 14.7 psia but it changes at different altitudes, decreasing at higher altitudes

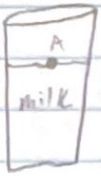
3.8.) False. can't be a negative absolute pressure

3.9.) True, since it is gage pressure, it is able to be negative

3.10.) True. Since it is gage pressure, it is able to be negative

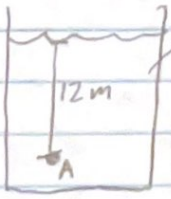
3.11.) $h = 4000$ ft from table $\Rightarrow$ $\boxed{P_{atm} = 12.7 \text{ psi}}$

3.13.)



$\boxed{P_{gage,A} = 0 \text{ psig}}$

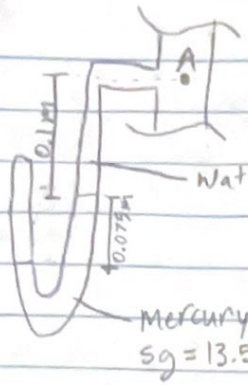
3.41.)



$\Delta P = \gamma_{eg} h$ $\quad \gamma_{eg} = 10.79 \frac{kN}{m^3}$

$10.79 \frac{kN}{m^3} \cdot 12 m = \boxed{129.48 \frac{kN}{m^2} = P}$

3.62)



$P_A = ?$

$P_A = P_1 - \gamma_m (0.075\ m) - \gamma_{H_2O} (0.1\ m)$

$P_A = 0 - (132.8 \frac{kN}{m^3})(0.075\ m) - 9.81 \frac{kN}{m^3} (0.1\ m)$

$P_A = -10.941 \frac{kN}{m^3}$

$\boxed{P_A = -10.941\ kPa\ gage}$

$\gamma_{H_2O} = 9.81 \frac{kN}{m^3}$

$\gamma_m = (sg)_m (9.81 \frac{kN}{m^3})$

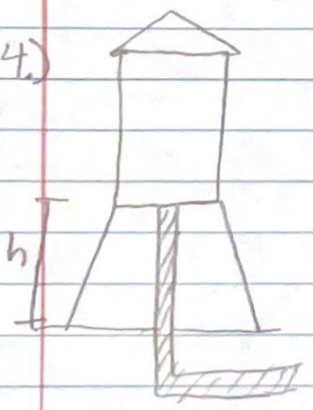
$\gamma_m = 13.54 \cdot 9.81 \frac{kN}{m^3}$

$\gamma_m = 132.8 \frac{kN}{m^3}$

3.83) $P = 14.2$ psia $\quad 14.2 \frac{lb}{in^2} \cdot \frac{2.036\ in\ Hg}{1 \frac{lb}{in^2}} = \boxed{28.91\ in\ Hg}$

3.90) $P = -12.6$ psig $\quad -12.6 \frac{lb}{in^2} \cdot \frac{2.036\ in\ Hg}{1 \frac{lb}{in^2}} = \boxed{-25.65\ in\ Hg}$

3.94)



$\Delta P = \rho_{H_2O} h g$

$h = \frac{\Delta P}{\rho_{H_2O} g} = \frac{160{,}000 \frac{N}{m^2}}{(1000 \frac{kg}{m^3})(9.81 \frac{m}{s^2})}$

$\boxed{h = 16.32\ m}$