EX_1

EX 1.1

During a heating process, the temperature of a system rises by $10^\circ C$. Express this rise in temperature in K, $^\circ F$, and R

$$\Delta K = \Delta^\circ C = 10K$$

$$\Delta R = \ 1.8\Delta^\circ C = 18R$$

$$\Delta^\circ F = \Delta R = 18^\circ F$$

EX 1.2

A vacuum gage connected to a chamber reads 5.8 psi at a location where the atmospheric pressure is 14.5 psi. Determine the absolute pressure in the chamber

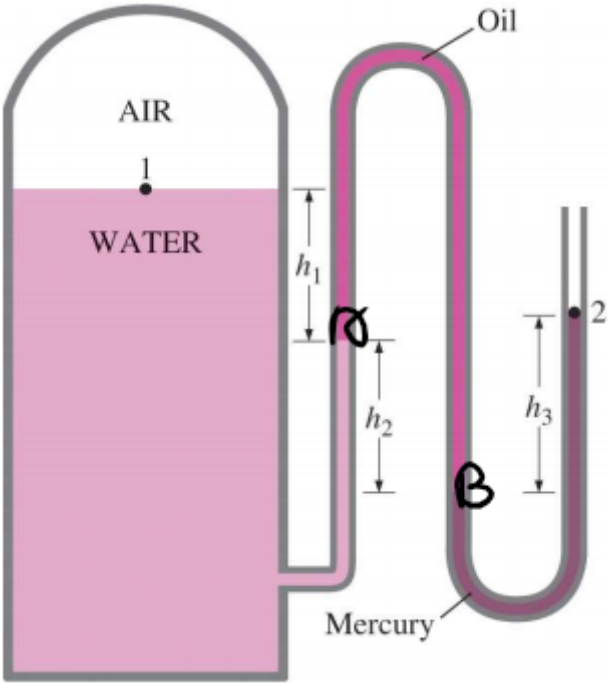
$$P_{vac} = P_{atm} - P_{atm}$$

$$= 14.5 - 5.8 = 8.7psi$$

EX 1.3

The water in a tank is pressurized by air, and the pressure is measured by a multifluid-manometer as shown in the following figure. The tank is located on a mountain where the atmospheric pressure is $85.6\ kPa$.

Determine the air pressure in the tank if $h_1 = 0.1\ m$, $h_2 = 0.2\ m$, and $h_3 = 0.35\ m$. Take the densities of water, oil, and mercury to be $1000\ kg/m^3$, $850\ kg/m^3$, and $13,600\ kg/m^3$, respectively.



$$
\begin{cases}
P_A = P_1 + \rho_w g h_1 \\
P_B = P_A + \rho_o g h_2 \\
P_B = P_2 + \rho_m g h_3
\end{cases}
$$

$$
\begin{aligned}
\Longrightarrow P_1 &= P_2+\rho_m gh_3-\rho_wgh_1 -\rho_O gh_2\\[2ex]
&= 129.65 kPa
\end{aligned}
$$

$$
\begin{aligned}
\Longrightarrow P_1 &= P_2 + \rho_m g h_3 - \rho_w g h_1 - \rho_O g h_2 \\
&= 129.65 kPa
\end{aligned}
\quad
\begin{aligned}
\Longrightarrow P_1 &= P_2 + \rho_m g h_3 - \rho_w g h_1 - \rho_O g h_2 \\
&= 129.65 kPa
\end{aligned}
$$