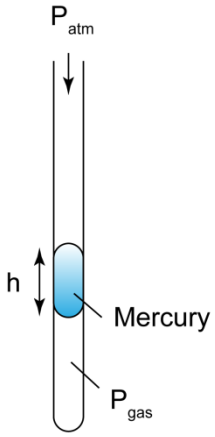
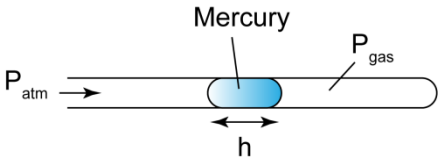
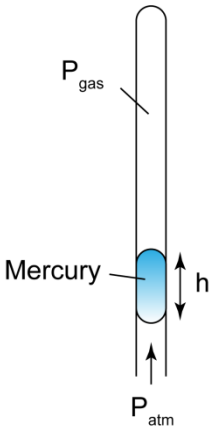
Pressure in a Capillary Tube







$P_{gas} = P_{atm} + h\rho g$ $P_{gas} = P_{atm}$ $P_{gas} = P_{atm} - h\rho g$

P_{gas} = gas pressure in the capillary tube *(Pa or N m^{-2})*
P_{atm} = atmospheric pressure *(Pa or N m^{-2})*
h = length of the captured mercury *(m)*
ρ = density of mercury *(kg m^{-3})*
g = gravitational field strength *(N kg^{-1})*

Example 1

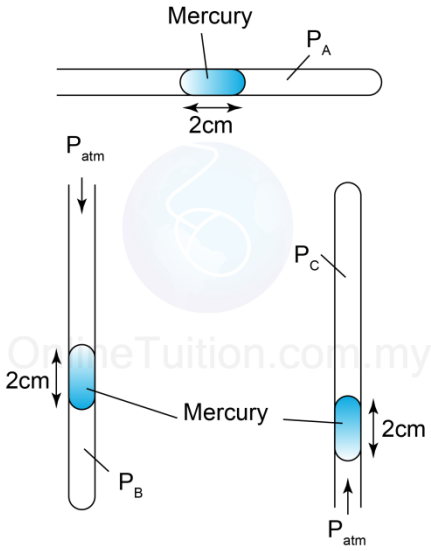


Figure above shows 3 identical capillary tubes with one end sealed and containing a column of mercury. P_A, P_B and P_C are the gas pressure in the capillary tubes respectively. Find the value of P_A, P_B and P_C. [Atmospheric pressure = 76cmHg]

[P_A = 76cmHg, P_B = 78cmHg, P_C = 74cmHg]
[Solution]

Example 2

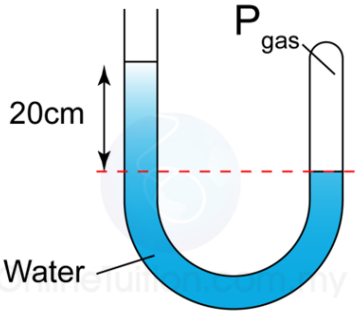


Figure 9 shows some air trapped in a J-tube. Find the pressure of the trapped air. [Density of water = 1000 kg/m^3; Atmospheric pressure = 100,000 Pa]

[P_{gas} = 102,000 Pa]
[Solution]