

Concept of Pressure :: (Slide 2).

29 November 2020 18:23

Laws of Pressure

① Pressure increases with the depth
 $P \propto h$

② Two points at the same level will experience same Pressure

[Press. at same level is equal] ★★

• Pressure = $\frac{\text{force}}{\text{area}}$

$$P = \frac{F}{A} \quad \text{or} \quad P = \frac{W}{A} \quad (\text{units } \text{Nm}^{-2})$$

• Pressure = ρgh

derivation is REQ

ρ = density

g = acc.

h = depth

$$P = \frac{F}{A}$$

$$P = \frac{mg}{A}$$

$$P = \frac{\text{density} \times \text{Vol} \times g}{A}$$

$$P = \frac{\rho \times (A \times h) \times g}{A}$$

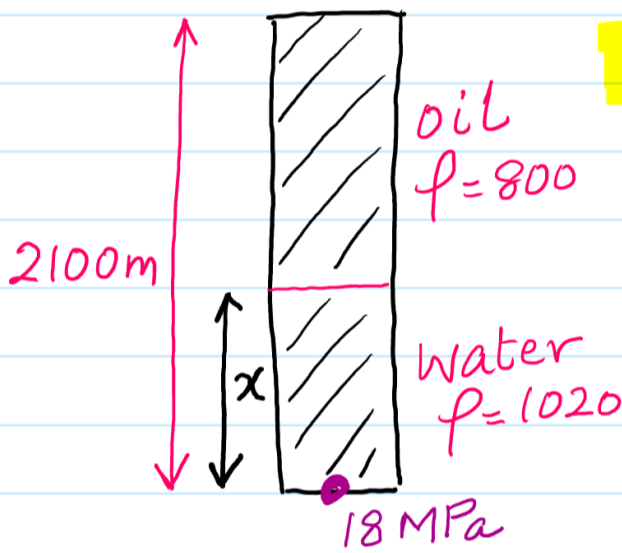
$$P = \rho gh.$$

$$P_{AT} = 760 \text{ mm of Mercury}$$

OR

$$P_{AT} = 1.01 \times 10^5 \text{ Pa.}$$

Ex. 1



closed

P_{AT} = ignored

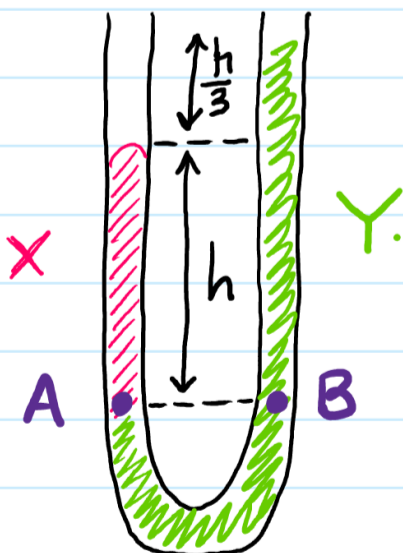
find x if the Pressure at the base of the Tank = 18 MPa.

$$P_{\text{base}} = P_{\text{water}} + P_{\text{oil}}$$

$$18 \times 10^6 = (1020)(9.81)(x) + (800)(9.81)(2100 - x)$$

$$x = 704 \text{ m}$$

Ex. 2



Liq. columns at rest. Use Pressure concept to calculate ratio of density of X ?
 $\frac{\text{density of X}}{\text{density of Y}}$

$$P_A = P_B$$

$$P_X + P_{AT} = P_Y + P_{AT}$$

$$\rho_X \cdot g \cdot (h) = \rho_Y \cdot g \cdot (h + \frac{h}{3})$$

$$\frac{\rho_X}{\rho_Y} = \frac{4}{3} \quad \text{Ans.}$$