Chapter (10)

Fluid

(ρ) Density = $\frac{\text{mass}}{\text{volume}}$ $\left(\frac{kg}{m^3}\right)$ $\frac{g}{cm^3}$

$\rho_{water} = 1000\ kg/m^3$

Specific gravity (x) = $\frac{\rho_x}{\rho_{water}}$

S.G(x) = 7.5 $\Rightarrow$ $\frac{\rho_x}{1000}$ $\Rightarrow$ $7500\ \frac{kg}{m^3}$

$\rho_x = 3\rho_y$

$y = 3\ m^3$

S.G(x) = 7.5 $\longrightarrow$ $\rho_x = 7500$

(y) mass = ??

$\rho = \frac{m}{V}$ $S.G_x = \frac{\rho_x}{\rho_w}$

$\frac{7500}{3} = \frac{m}{3}$

$\frac{7500}{3} = \frac{3\rho_y}{3}$

$m = 7500\ kg$

$P = \frac{F}{A}\sin\theta$ (N/m^2) (pascal)

θ

60kg

2 feet = 500 cm^2

$1 m^2 = 100 cm^2$

$1 m^2 = 10000 cm^2$

$\therefore$ 500 cm^2

$P = \frac{F}{A} = \frac{600}{0.05} = 12000$ Pas

12 kpas

(N/m^2) F = ??

P_1

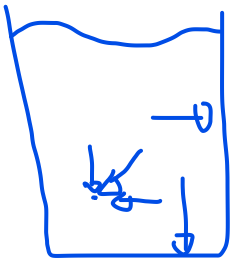
1 Feet → F ??

P_2

$P = \frac{F}{A} = \frac{600}{0.025} = 24000$ Pas

Static fluids

(1) At any point inside the liquid, the pressure is the same in all direction.



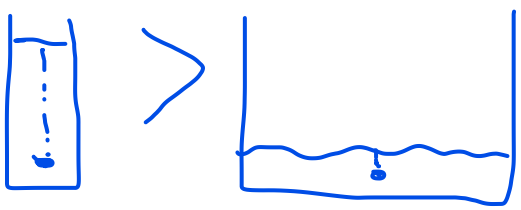
(2) The pressure of any static fluid is always perpendicular to the surface

$\rho = \frac{m}{V}$ $\quad m = \rho V$

$$P = \frac{F}{A} = \frac{mg}{A} = \frac{\rho V g}{A} = \frac{\rho A h g}{A}$$

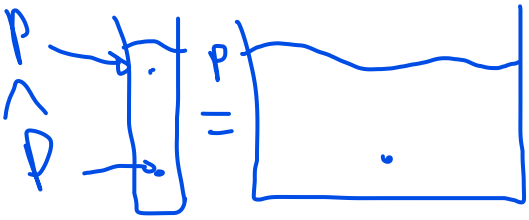
$$P = \rho h g$$

P



P

P

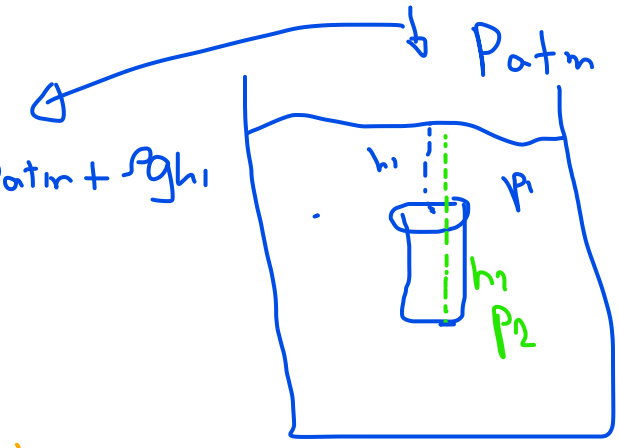


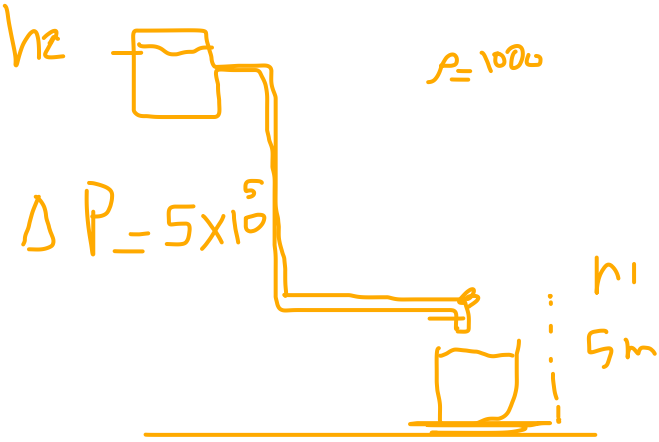
$P_1 = \rho g h_1$

$P_2 = \rho g h_2$

$P_2 - P_1 = \rho g h_2 - \rho g h_1$

$\Delta P = \rho g (\Delta h)$





$5 \times 10^5 = 10^3 (10) \Delta h$

$5 + 5 \times 10 = h_2$

$55_m = h_2$

Atmospheric pressure

$1.013 \times 10^5 Pa = 1.013 \text{ bar} = 1 atm = 760 mmHg$

$1 \text{ bar} = 10^5 Pas$

$760 \text{ mm Hg} = 1 atm$