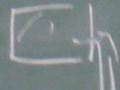


$$P = \frac{F}{A} \quad (\text{N/m}^2, \text{ Pascal (Pa)})$$

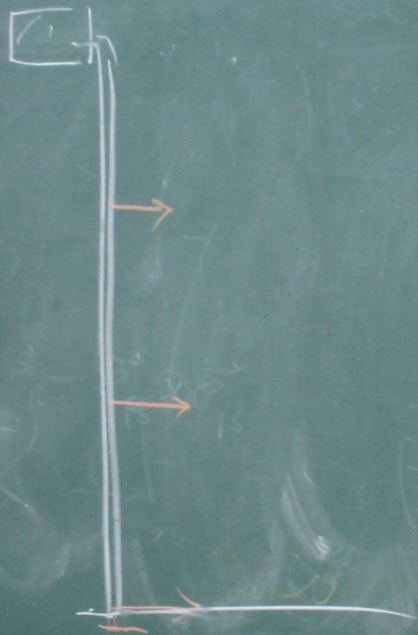
$$p = \frac{F}{A} = \frac{\rho A h g}{A} = \rho g h$$



$$\rho g h$$

$$N = m a$$

$$\text{kg m/s}^2$$



$$\begin{aligned} & \rho g h \\ & \downarrow \\ & [10^3 \text{ kg/m}^3] [9.8 \text{ m/s}^2] [30 \text{ m}] = 2.94 \times 10^5 \frac{\text{kg}}{\text{s}^2 \cdot \text{m}} \\ & = 2.94 \times 10^5 \text{ N/m}^2 \end{aligned}$$

$$\begin{aligned} \text{N} &= m a \\ & \text{kg m/s}^2 \end{aligned}$$

In 3-P

$$\rho \propto P$$

$$\rho = \frac{P}{P_0} \rho_0$$

$$\frac{\rho}{\rho_0} = \frac{P}{P_0}$$

$$\rho_0 = 1.29 \text{ kg/m}^3$$

$$\rho = P \frac{\rho_0}{P_0}$$

$$\frac{dP}{dy} = -\rho g$$

$$= -g P \frac{\rho_0}{P_0}$$

$$\int_{P_0}^{P_h} \frac{dP}{P} = - \frac{\rho_0}{P_0} g \int_0^h dy$$

$$\Rightarrow \ln \frac{P_h}{P_0} = - \frac{\rho_0}{P_0} g h$$

$$P_h = P_0 e^{-\left(\frac{\rho_0}{P_0}\right) g h}$$

$\rho g h$

$$\frac{1}{\alpha} = \frac{P_0}{g \rho_0}$$

$$= 1.25 \times 10^{-4} \text{ m}^{-1}$$

2m



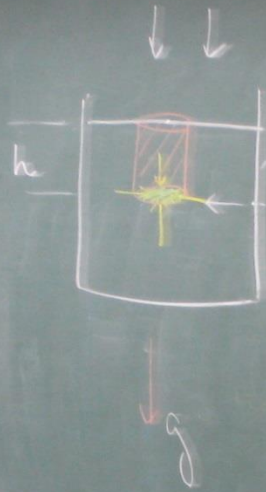
3m

$$W = 1.764 \times 10^{10} \text{ N}$$

$$3 \int_0^{2.0} \rho g y dy$$

$$= 3 \rho g 2 = 6 \times 10^3 \times 9.8$$

$$= 5.88 \times 10^5 \text{ N}$$

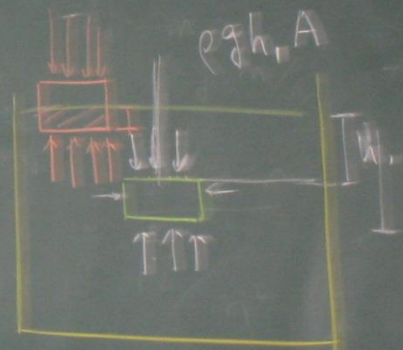


$$P = \frac{F}{A} \quad (\text{N/m}^2, \text{Pascal (Pa)})$$

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

$$P_{\text{atm}} = 1.013 \times 10^5 \text{ N/m}^2 = 101.3 \text{ kPa} = 1.013 \text{ bar}$$

$$\begin{aligned} 6.079 &\rightarrow mg \rightarrow \rho V g \\ \downarrow & \\ 5.500 & \\ \frac{\rho V g}{(\rho - 1) V g} &= \frac{\rho}{\rho - 1} = \frac{6.079}{5.500} \\ (6.079 - 5.5) \rho &= 6.079 \end{aligned}$$



In 3-D

$$\rho \propto P$$

$$\rho_0 \quad P_0$$

$$\frac{\rho}{\rho_0} = \frac{P}{P_0}$$

$$\rho_0 = 1.29 \text{ kg/m}^3$$

$$\rho = P \frac{\rho_0}{P_0}$$

$\rho g h$

$$\frac{dP}{dy} = -\rho g$$

$$= -g P \frac{\rho_0}{P_0}$$

$$\int_{P_0}^{P_h} \frac{dP}{P} = - \frac{\rho_0}{P_0} g \int_0^h dy$$

$$\Rightarrow \ln \frac{P_h}{P_0} = - \frac{\rho_0}{P_0} g h$$

$$P_h = P_0 e^{-\left(\frac{\rho_0}{P_0}\right) g h}$$

$$-\frac{\alpha h}{\alpha}$$

$$\frac{1}{\alpha} = \frac{P_0}{g \rho_0}$$

$$= 1.25 \times 10^{-4} \text{ m}^{-1}$$



$$W = 1.764 \times 10^{10} \text{ N}$$

$$3 \int_{y=0}^{2.0} \rho g y dy$$

$$= 3 \rho g^2 = 6 \times 10^3 \times 9.8$$

$$= 5.88 \times 10^5 \text{ N}$$



$$m = \rho A_1 \Delta l_1$$

$$= \rho A_2 \Delta l_2$$

$$\boxed{A_1 v_1 = A_2 v_2}$$

$$\frac{1}{2} m v_2^2 - \frac{1}{2} m v_1^2 = \underbrace{P_1 A_1 \Delta l_1}_{\rho A_1 \Delta l_1 v_1} - \underbrace{P_2 A_2 \Delta l_2}_{\rho A_2 \Delta l_2 v_2} - \underbrace{m g y_2}_{\rho A_2 \Delta l_2 g y_2} + \underbrace{m g y_1}_{\rho A_1 \Delta l_1 g y_1}$$

$$\frac{1}{2} \rho v_2^2 - \frac{1}{2} \rho v_1^2 = \underline{P_1 - P_2} + \rho g y_2 + \rho g y_1$$

$$\rho A_1 \Delta l_1$$

$$\rho A_2 \Delta l_2$$

$$P + \frac{1}{2} \rho v^2 + \rho g y = \text{常數}$$

$$P_1 + \frac{1}{2} \rho v_1^2 + \rho g y_1 = P_2 + \frac{1}{2} \rho v_2^2 + \rho g y_2$$



$$m = \rho A_1 \Delta l_1$$

$$= \rho A_2 \Delta l_2$$

$$A_1 v_1 = A_2 v_2$$

$$\frac{1}{2} m v_2^2 - \frac{1}{2} m v_1^2 = \underbrace{P_1 A_1 \Delta l_1}_{\rho A_1 \Delta l_1 v_1} - \underbrace{P_2 A_2 \Delta l_2}_{\rho A_2 \Delta l_2 v_2} - \underbrace{m g y_2}_{\rho A_2 \Delta l_2 g y_2} + \underbrace{m g y_1}_{\rho A_1 \Delta l_1 g y_1}$$

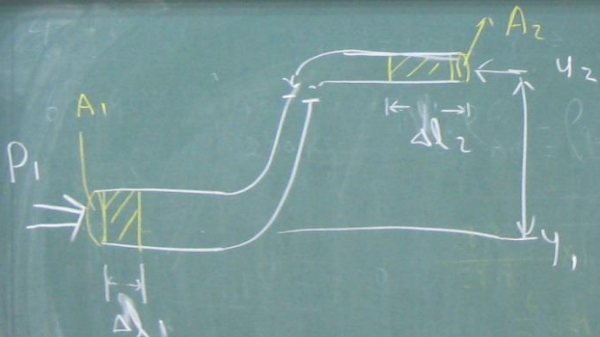
$$\frac{1}{2} \rho v_2^2 - \frac{1}{2} \rho v_1^2 = \underline{P_1 - P_2} + \rho g y_2 + \rho g y_1$$

$$P_1 + \frac{1}{2} \rho v_1^2 + \rho g y_1 = P_2 + \frac{1}{2} \rho v_2^2 + \rho g y_2$$

$$\rho A_1 \Delta l_1$$

$$\rho A_2 \Delta l_2$$

$$P + \frac{1}{2} \rho v^2 + \rho g y = \text{常數}$$



$$W_1 = P_1 A_1 \Delta l_1$$

$$W_2 = P_2 A_2 \Delta l_2$$

$$W_3 = -m g (y_2 - y_1)$$