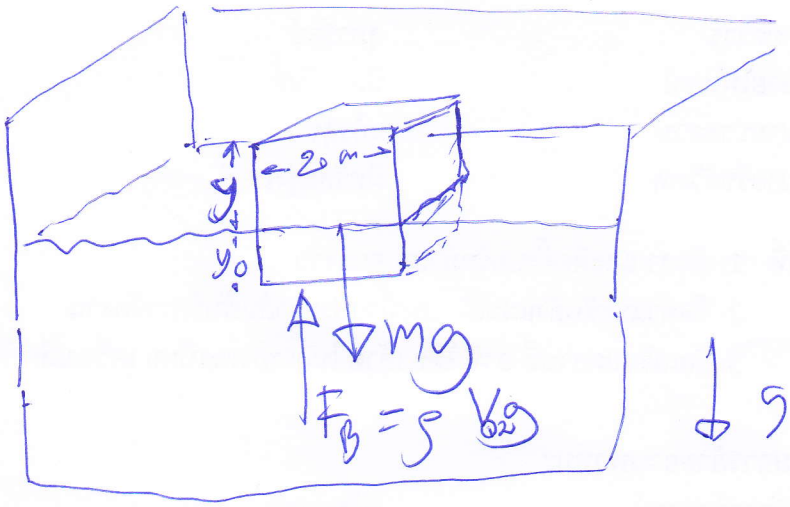
เฉลยกลศาสตร์ของไหล

(1)



$y + y_0 = 20\ cm.$

ให้ $\rho_{วัตถุ} = 0.65 \times 10^3\ kg/m^3$

(1) $V_{02} = y_0 (20\ cm \times 20\ cm)$

$= 400 \times 10^{-4} y_0$

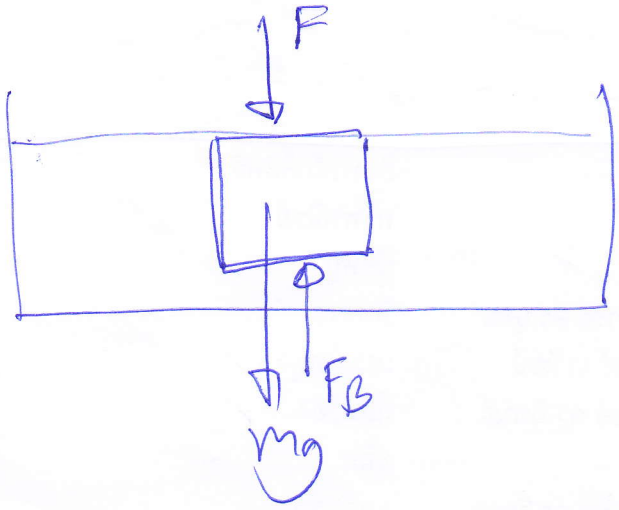
จากกฎของ แรงลอย $F_B = mg$

$\rho_{น้ำ} V_{02} g = \rho_{วัตถุ} V g$

$1 \times 10^3 (400 \times 10^{-4}) y_0 = 0.65 \times 10^3 (20\ cm)^3$

$\Rightarrow y_0 = 0.65 \times 20\ cm = 13.0\ cm$ #

(1)



ดัน $F + mg = F_B$

$$F = F_B - mg = \rho_{น้ำ} V g - \rho_{ลูกบาศก์} V g$$

$$= (\rho_{น้ำ} - \rho_{ลูกบาศก์}) V g = (10^3 - 0.65 \times 10^3)(20\,cm)^3 \times 10$$

$$= 0.35 \times 10^3 \times 8000 \times 10^{-6} \times 10 \quad N$$

$$= 28 \quad N$$

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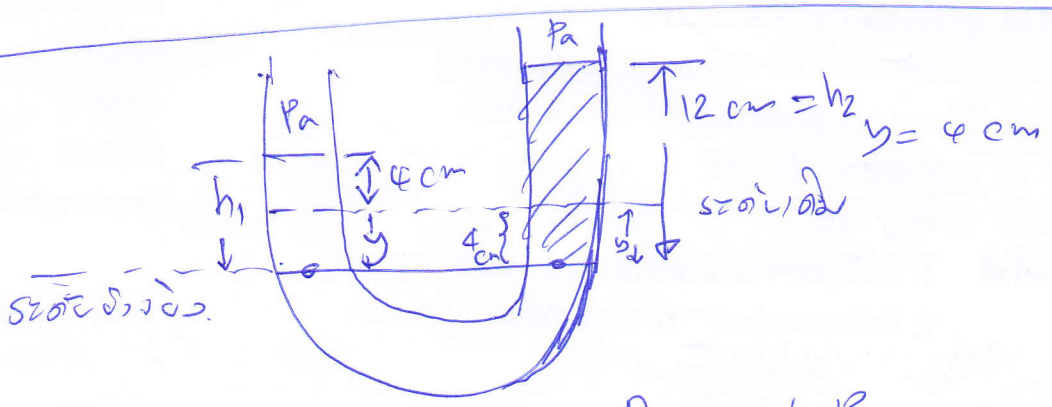
(2)

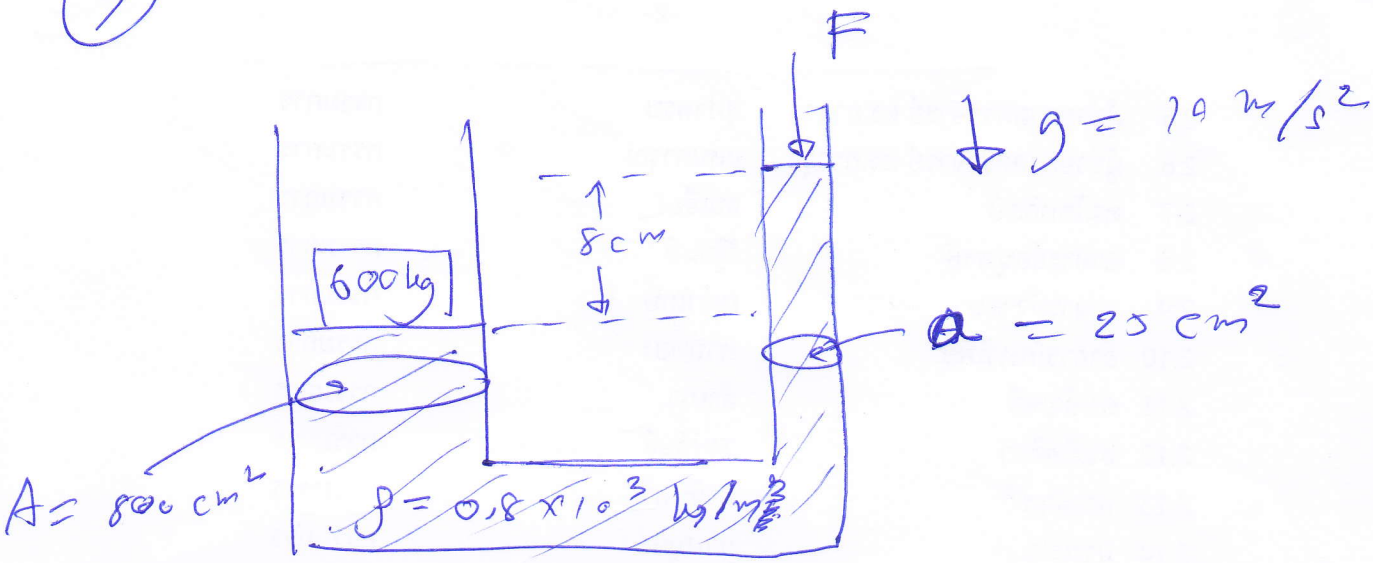


$$P_a + P_{น้ำ,1} = P_{ของเหลว} + P_a$$

$$\rho_{น้ำ} g h_1 = \rho_{ของเหลว} g h_2$$

$$\frac{2}{3} = \frac{8}{12} = \frac{h_1}{h_2} = \frac{\rho_{ของเหลว}}{\rho_{น้ำ}} \Rightarrow 0.67 = \text{ความสัมพัทธ์ของของเหลว}$$

(3)



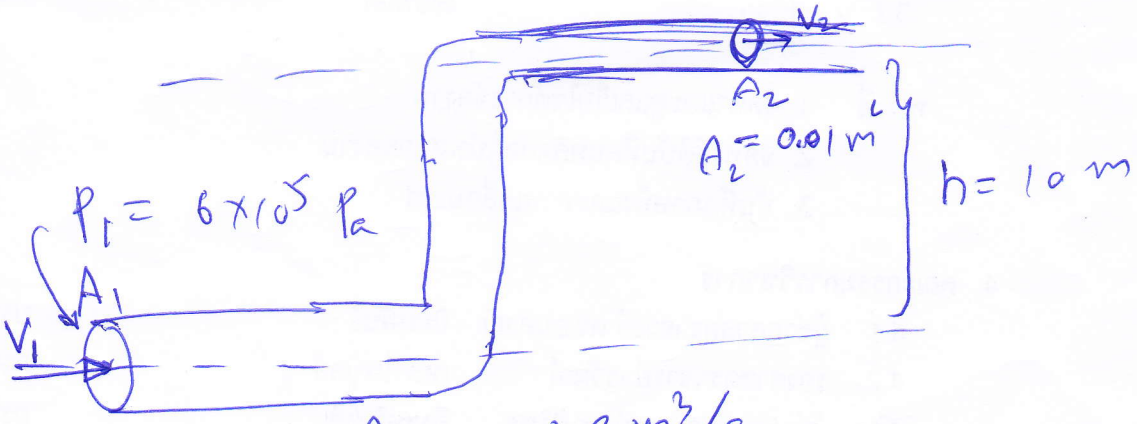
$P_{ใหญ่} = P_{ของเหลว}$

$$\frac{Mg}{A} = \frac{F}{a}$$

$$\frac{6000}{800} = \frac{F}{25}$$

$$F = \frac{25 \times 60}{8} = 187.5 \text{ N}$$

(4)



อัตราการไหล $= A_1 V_1 = 0.2 m^3/s$

$A_1 = 0.02 m^2$

ดน $P_1 + \frac{1}{2}\rho V_1^2 + \rho g h_1 = P_2 + \frac{1}{2}\rho V_2^2 + \rho g h_2$

ดน $A_1 V_1 = A_2 V_2$

$0.2 = (0.01) V_2$

$V_2 = \frac{0.2}{0.01} = 20 \text{ m/s}$

แล้ว $0.2 = A_1 V_1 = 0.02 V_1$

$\Rightarrow V_1 = 10 \text{ m/s}$

$h_2 - h_1 = h = 10 \text{ m.}$

ตามสมการ $P_2 = P_1 + \frac{1}{2}\rho(V_1^2 - V_2^2) + (h_1 - h_2)\rho g$

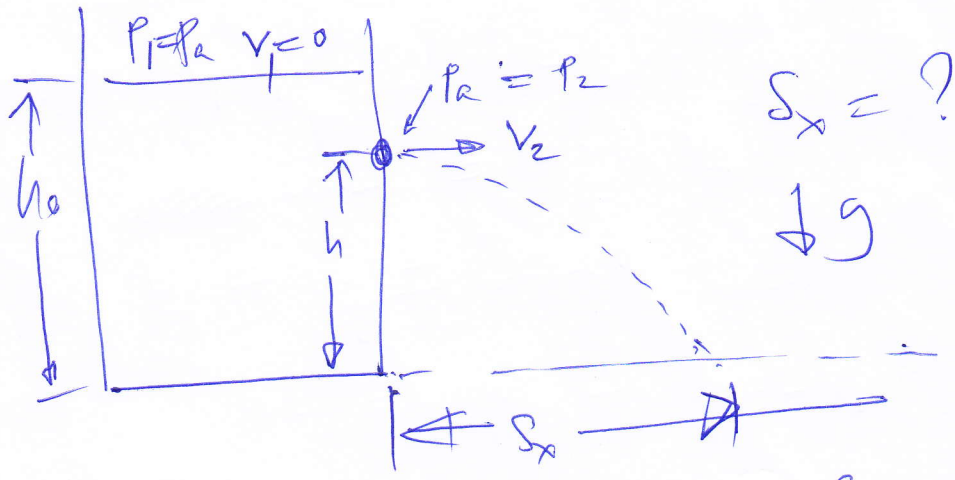
แทน $P_2 = 6\times10^5 + \frac{1}{2}\times10^3(100-400) - 10^3\times10\times10$

$= 6\times10^5 - 150\times10^3 - 100\times10^3$

$= 350\times10^3 \text{ N/m}^2$

$= 3.5\times10^5 \text{ N/m}^2$ #

(5)



แทน v_2 ลงใน

$$P_1 + \frac{1}{2}\rho v_1^2 + \rho g h_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g h_2$$

$P_1 = P_2 = P_a$, $v_1 = 0$

$$\rho g(h_1 - h_2) = \frac{1}{2}\rho v^2$$

$$v = \sqrt{2g(h_0 - h)} \quad \text{---} (1)$$

หาเวลาที่ใช้ในแนวดิ่งก่อน $S_y = h = \frac{1}{2}gt^2$

$$t = \sqrt{\frac{2h}{g}} \quad \text{---} (2)$$

$$S_x = vt = \quad \text{---} (3)$$

แทน (1) & (2) ลง (3) $v = \sqrt{\ }$

$$S_x = \sqrt{2g(h_0 - h)}\sqrt{\frac{2h}{g}}$$

$$= 2\sqrt{h(h_0 - h)}$$