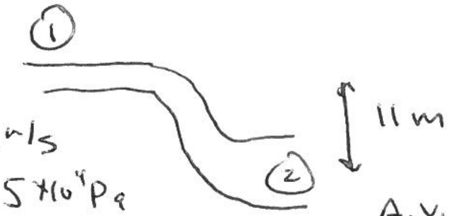
class 2 ch 12 46, 67, 69

(46)



$v_1 = 3\ m/s$
$P_1 - P_0 = 5\times10^4\ Pa$
$y_1 = 11$

$V_2 = \frac{A_1 v_1}{A_2} = \frac{1}{4} v_1 = .75\ m/s$
$P_2 - P_0 = ?$
$y_2 = 0$

Subtract atm pressure to get gauge pressure on both sides

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

$\frac{1}{2} 1000 (3^2 - .75^2) + 1000 \cdot 9.8 \cdot 11 + 5\times10^4 = P_2$ gauge

$= 1.62 \times 10^5\ Pa$

(67) Bouyant force = weight displaced air = $V \rho_a g$

= weight supported = $V \rho_x g$ + 90 k N

$V(\rho_a - \rho_x) = 90kN/g$

$V = \frac{90\ kN/g}{(\rho_a - \rho_x)}$

$1.20\ kg/m^3$ ↗ ↖ H_2: .0899 kg/m3
He : .166

$V_{H_2} = 8.27\times10^3\ m$
$V_{He} = 8.88\times10^3\ M$ ← volume for same lift

He lift = $Vg(\rho_a - \rho_{He})$ = 83.8 kN ← lift for same volume
↖ does not burn

(b) $d \to 2x \Rightarrow V \Rightarrow \frac{1}{4} x$
$\Rightarrow \Delta y = \frac{1}{16} x$
$= \frac{28}{16} = 1.75 m$

(69) $v = 0$

28m {

↑ $v_0 = ?$

$.5\ m^3/s = \frac{\pi}{4} d^2 \cdot 23.43$

$d = .165\ m$

$v^2 - v_0^2 = 2(-g)\Delta y \to v_0^2 = 2 \cdot 9.8 \cdot 28 \to v_0 = \sqrt{2\ 9.8\ 28} = 23.43\ m/s$