Fluids #2

p 383 MC 6, 7, 10
p 385 Problems 29, 32, 43, 44

(9)

p383 – Multiple Choice

6)  Hold paper horizontaly

Fnet atmosphere?

c) Zero - up + down P equal & cancel

(3)

7)  Hold cylinder vertically Fnet b/c of atmosphere?

upward → more air, greater P

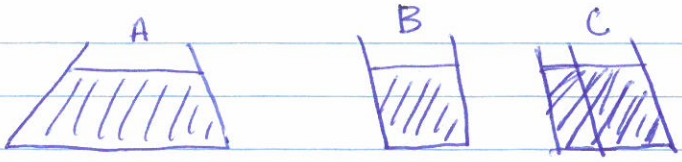
10) Why can't suction pump lift water higher than 10.3m?

$$h = \frac{P}{\rho g} = \frac{1.01 \times 10^5 N/m^2}{(1000 kg/m^3)(9.8 m/s^2)} = 10.3 m$$

Atmospheric pressure is equal to pressure create by column of water of that height

p385 – Problems

29) 3 resevoirs



a) Rank pressure $P_A = P_B = P_C$

Same height, liquid
Same pressure

(1)

b) Rank force on bottom?

$F = PA$ Same pressure, diff A

$F_A > F_C > F_B$ ↑A ↑F

32) diameter = 2.0cm Holland boy plugs hole in dike w/ fist
h = 3.0m below sea level

a) What can you determine?

✓ Pressure at location of hole
✗ force of friction b/t fist + dike
✓ Force exert on fist by water
✗ mass boy

(1) b) Pressure? $P = P_o + \rho g h$

$P = (1.0\times10^5\ N/m^2) + (1000\ kg/m^3)(9.81\ m/s^2)(3.0m)$

$P = 1.3\times10^5\ N/m^2$

c) Force? $F = PA = P(\pi r^2)$

$= (1.3\times10^5\ N/m^2)\,\pi\,(1.0\times10^{-2}m)^2$

$F = 41\ N$

43) water + oil in U tube meet at bottom center

(1) $\rho_{oil} = 900\ kg/m^3$
$h_{oil} = .16m$

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

could be left in cm

$P_{oil} = P_{water}$
$P_{atm} + \rho_o g h_o = P_{atm} + \rho_w g h_w$

$h_w = \frac{\rho_o h_o}{\rho_w}$

$= \frac{(900\ kg/m^3)(.16m)}{1000\ kg/m^3} = .14\ m$

44) photo of Hoover Dam. Explain why dam is thicker at bottom

The design of the dam takes into consideration the fact that pressure in the water increases with the depth.

Since the force exerted on the fragment of the wall of area A is $F = PA$, the force is the greatest at the bottom of the dam.

Thus the wall is thicker at the bottom than at the top in order to withstand the force

(1)