8-23-13

Applications of Bernoulli's Law:

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

OR $P_1 - P_2 = \frac{1}{2}\rho_\ell (v_2^2 - v_1^2) + \rho g (y_2 - y_1)$ *

(1) STORMS

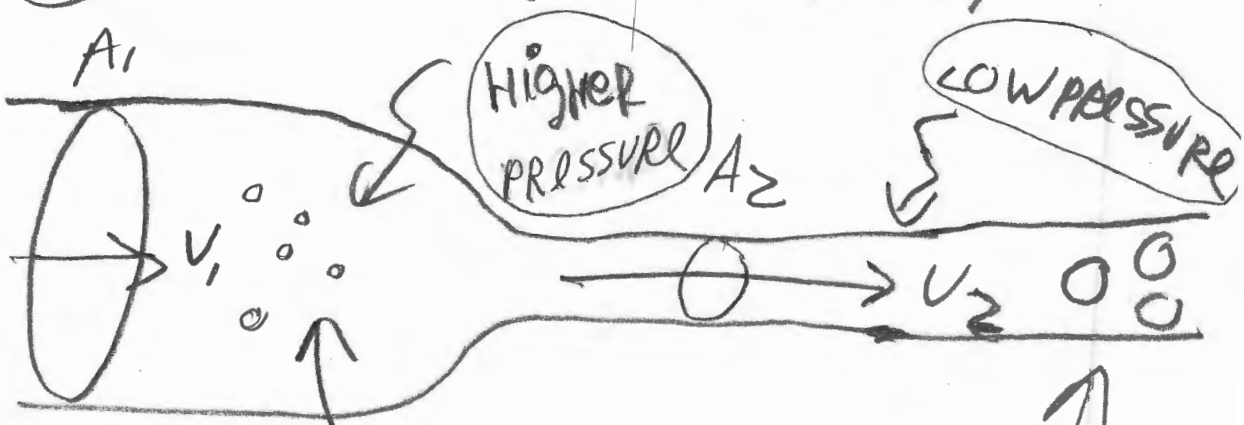
where pressure is

<u>low</u> speed is

<u>high</u> : STORMS!

$$P + \rho_\ell g y + \frac{1}{2}\rho_\ell v^2 = \text{constant}$$

(2.) Bubble formation



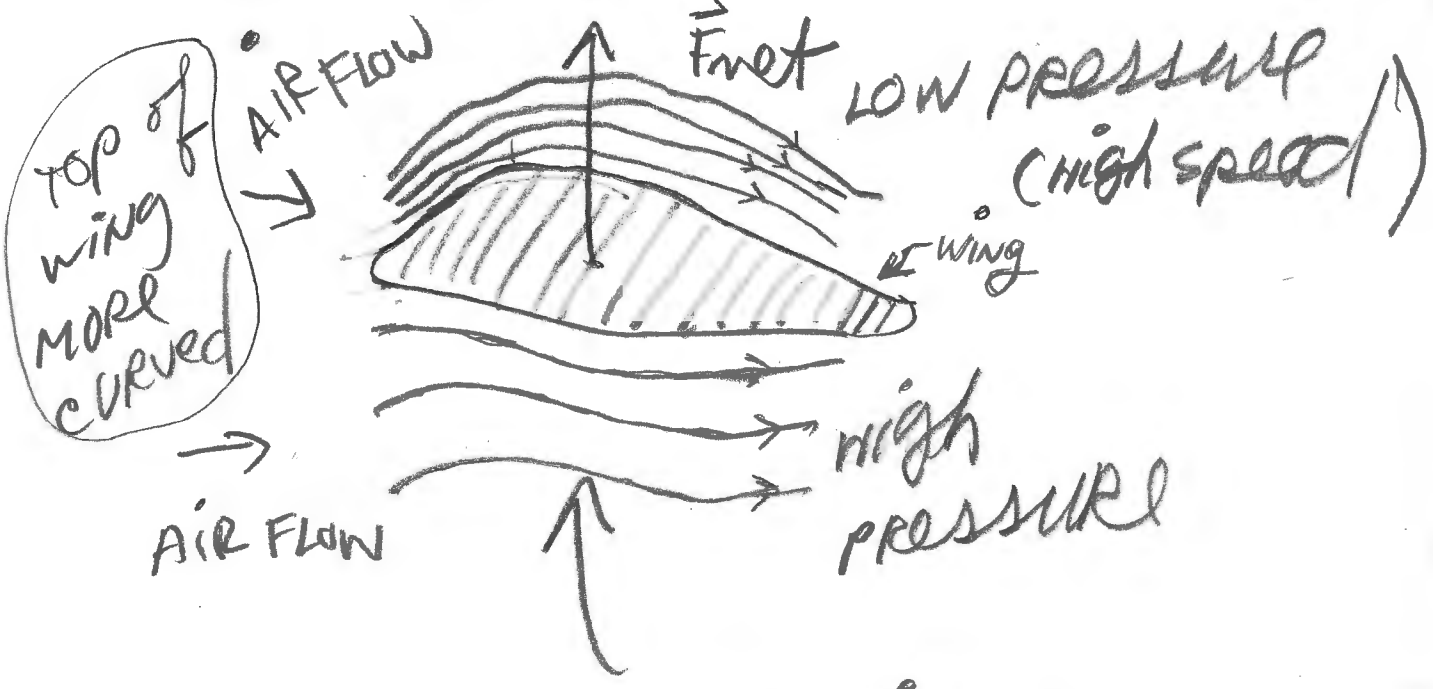
* $P_1 - P_2 = \Delta P$

$= \frac{\text{change in KE}}{\text{volume}} + \frac{\text{change in PE}}{\text{volume}}$

example 12.10 (see also example 12.9)

(3.) aircraft flight: 4F.

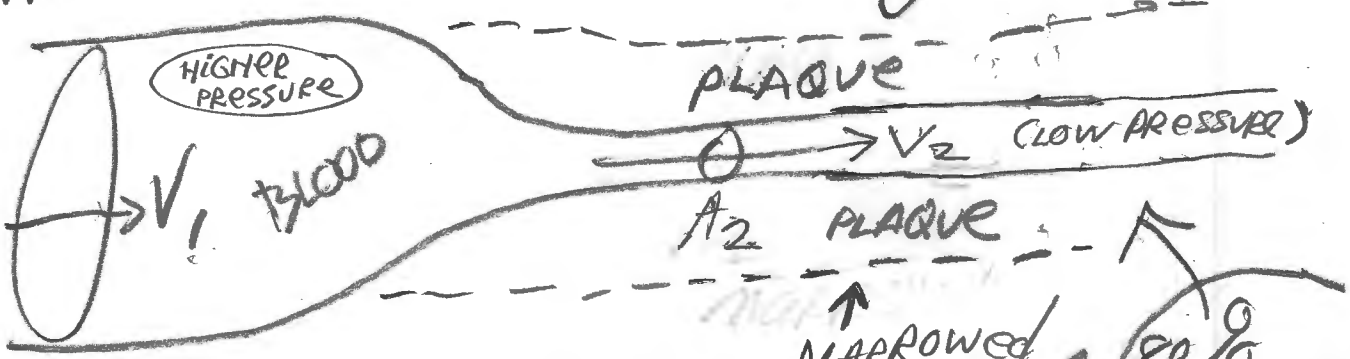
take a piece of paper and BLOW AIR ON TOP OF IT: EXPLAIN WHY THE PAPER RISES.



FLUID STREAMLINES:
LINES ARE CLOSE: SPEED IS HIGH.
" " FAR APART: SPEED LOW.

(4.) BLOOD circulation and vessel collapsing causing BLOCKAGE

wide vessel



$\rho_{BLOOD} = 1060\ kg/m^3$

$A_1 V_1 = A_2 V_2$

$V_1 = 50\ \frac{cm}{s}$ = TYPICAL BLOOD FLOW.

$V_2 = \frac{A_1}{A_2} \cdot V_1 = \frac{A_1}{0.2A_1}\left(0.50\ \frac{m}{s}\right)$

$= 2.5\ \frac{m}{s}$.

a DROP in PRESSURE in NARROW PART CAN cause a collapse.

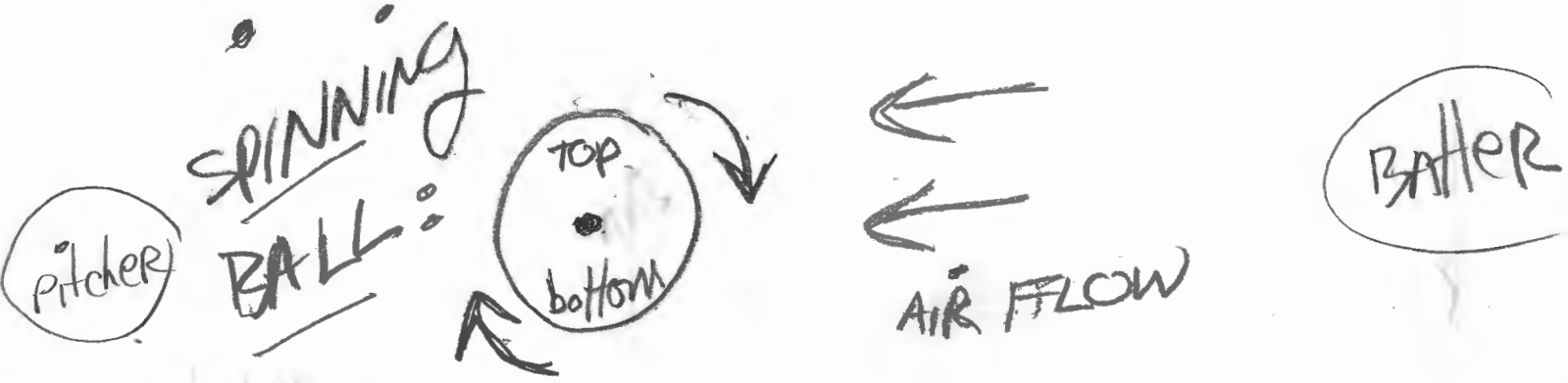
$P_1 - P_2 = \frac{1}{2}\left(1.06\times10^3\ \frac{kg}{m^3}\right)\left((2.5\ \frac{m}{s})^2 - (0.50\ \frac{m}{s})^2\right)$

$\Delta P = 3.2\times10^3\ Pa\ (N/m^2) \Rightarrow$ causes collapsed vessel!

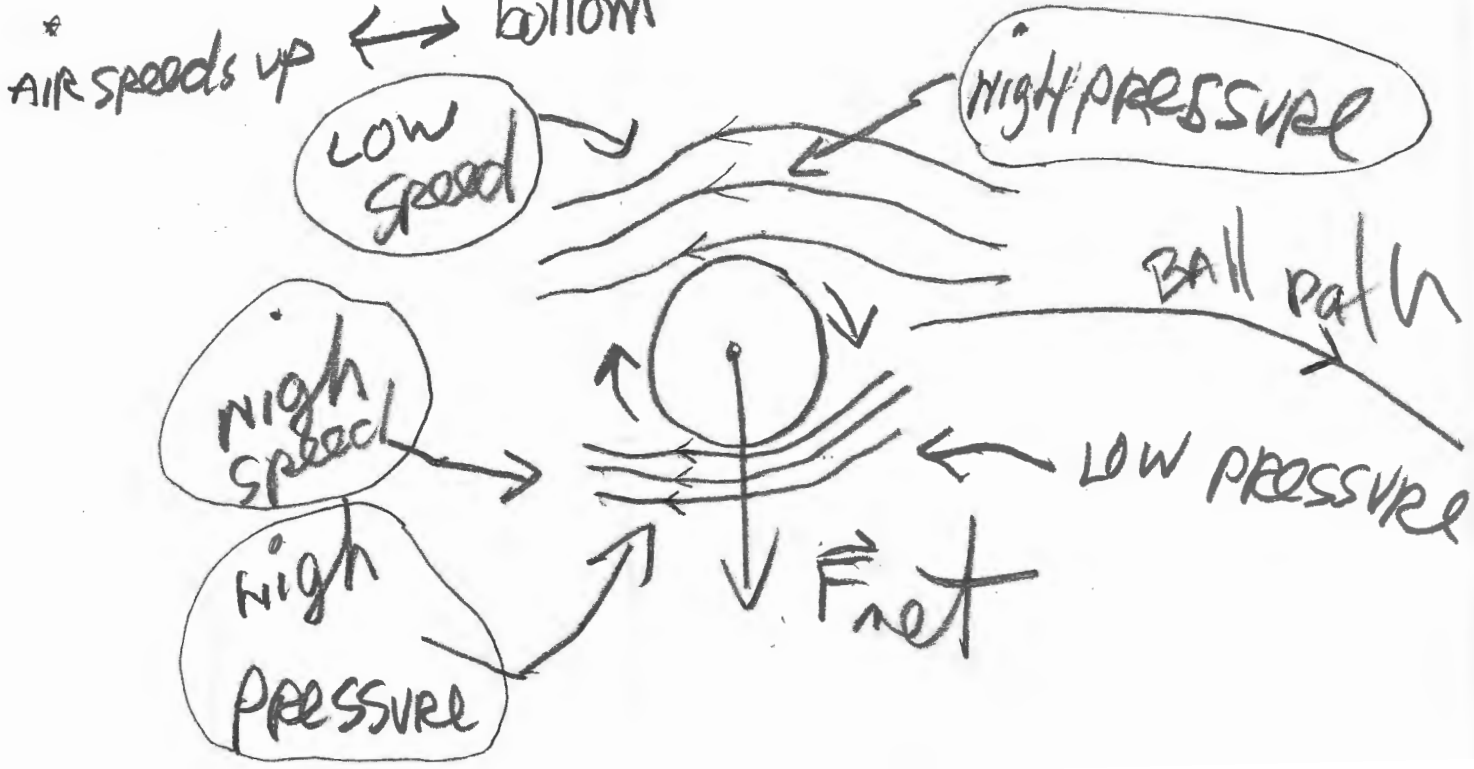
= LARGE PRESSURE DROP.

5.

Curve Balls (example 12.7)

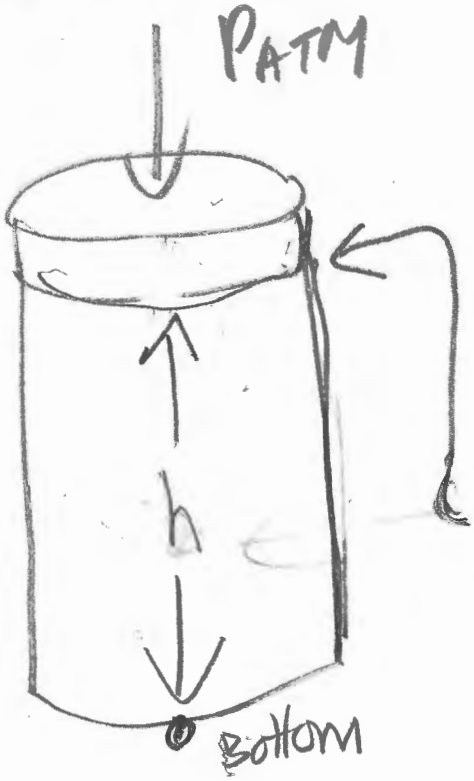


AIR SLOWS ⟷ TOP moves opposite FLOW
AIR speeds up ⟷ bottom with



More Hints to Quiz 1

21.



Absolute pressure

$P = P_{ATM} + \frac{m_{wood} g}{A}$

(B) Without the weight:

(A) $P_{gauge} = \frac{m_{wood} g}{A}$

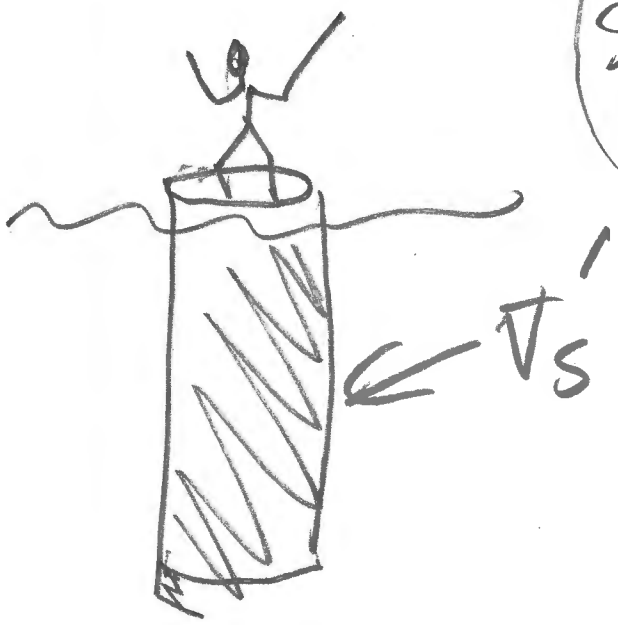
$$P_{bottom\ (gauge)} = \frac{m_{WOOD} g}{A} + \rho_{OIL} \cdot g \cdot (h)$$

With weight:

$$P_{bottom\ (gauge)} = \frac{m_{WOOD} g}{A} + \rho_{OIL} g (h) + \frac{m g}{A}$$

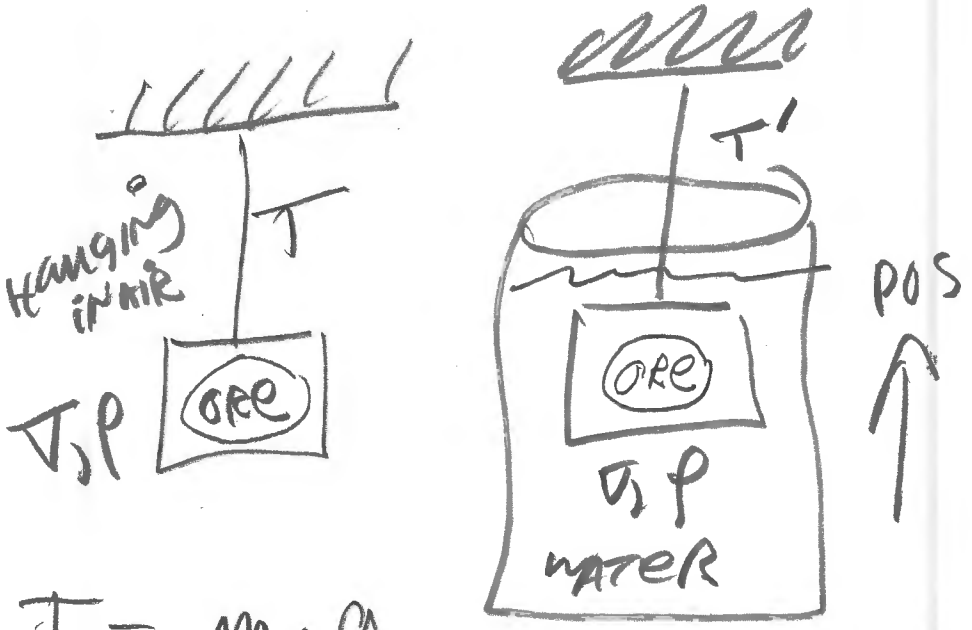
FIND ΔP; repeat at a location half-way down.

#25



see HINT #26, CH 12

27. Like Lab 1



$T = m_{ORE} \cdot g$

$T' < T$

$m_{ORE} = \rho \cdot V$

$\Sigma F_y = 0 = pos - neg$

$0 = T' + B + m_{ORE} \cdot g$

Given: $T = 15.70(N)$

Given: $T' = 10.70(N)$

A: FIND V; HINT $B = \rho_{\ell} V \cdot g$

B: FIND ρ; HINT $\rho = \frac{m_{ORE}}{V}$