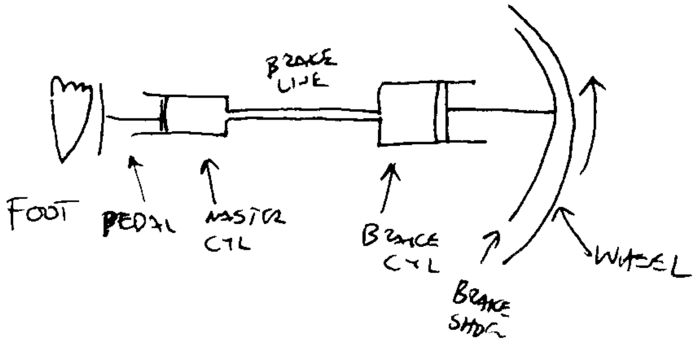
(25)



$$F_{FOOT}\left(\frac{A_B}{A_M}\right) = F_{SHOE} = 44N\left(\frac{6.4}{1.8}\right) = 156.4\ N$$

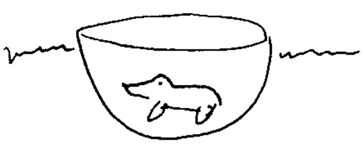
WHICH WILL ACT LIKE A NORMAL FORCE...

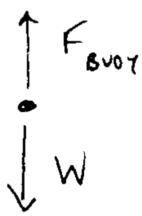
$$F_f = \mu F_{SHOE} = .5(156.4) = 78.2\ N$$

$$\tau = F \cdot d = 78.2(.34) = 26.6\ N \cdot m$$

I THINK THE BOOK DID THIS WRONG...

(26)





SO $mg = \rho g Vol$

OR $m = \rho Vol$

$$= (1350\ kg/m^3)\left(\frac{1}{2}\right)\left(\frac{4}{3}\pi(.06)^3\right)$$

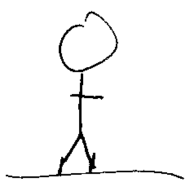
$$M = .61\ kg$$

(27) THE ADDITIONAL AMOUNT OF SINKING IS GONNA GIVE US A BUOYANT FORCE EQUAL TO THE ADDITIONAL WEIGHT ... THE TRUCK

$$F_{Buoy} = \rho g Vol = 1000(9.8)(4 \times 6 \times .04) = 9408\ N$$

AP PHYSICS – CH 9

(13)



$m = 50.0\ kg \rightarrow W = 490N$

$A = 26.0\ cm^2 \rightarrow A = .0026\ m^2$

So $P = \frac{F}{A} = \frac{W}{A} = \frac{490}{.0026}$

$P = 1.88 \times 10^5\ Pa$

BUT IF SHE IS JUMPING $F = W + ma = 490N + (50kg)(4.00\ m/s^2)$

$= 690N$

$P = 2.65 \times 10^5\ Pa$

(14) $P = \frac{F}{A}$ so $F = PA = (2.0 \times 10^5\ Pa)(4)(.024\ m^2) = 1.92 \times 10^4 N$

↑ 4 TIRES!

(23)

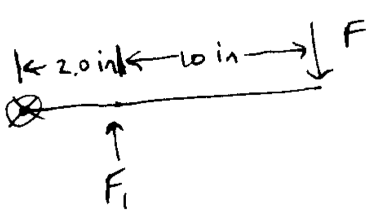
$P_{ABS} = P_{ATM} + P_{OIL} + P_{H_2O} = 1 \times 10^5 + \rho_{OIL}\, g\, h_{OIL} + \rho_{H_2O}\, g\, h_{H_2O}$

$= 1 \times 10^5 + (700)(9.80)(.30) + (1000)(9.80)(.2$

$= 1.04 \times 10^5\ Pa$

(24) $P_1 = P_2$ so $\frac{F_1}{A_1} = \frac{F_2}{A_2}$ so $F_1 = \left(\frac{A_1}{A_2}\right) F_2 = \frac{(.25)^2}{(1.5)^2}\ 500\ lbs = 13.88\ lbs$

BUT WE ALSO HAVE THE HANDLE TO CONSIDER . . .

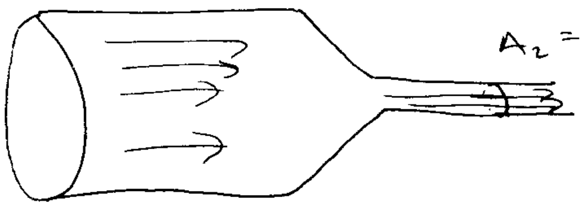


so $F(12in) = F_1(2in)$

$F = F_1 \frac{(2)}{(12)} = 2.31\ lbs$

(42)

$A_1 = 10\ cm^2$ $A_2 = 2.5\ cm^2$



$A_1 V_1 = A_2 V_2$

$10\ cm^2\ (275\ m/s) = (2.5)(V_2)$

$V_2 = 1100\ \text{cm/s}$

$\boxed{V_2 = 11\ m/s}$

BERNOULLI'S (w/o $\rho g y$ TER[M])

↓

$P_1 + \frac{1}{2}\rho V_1^2 = P_2 + \frac{1}{2}\rho V_2^2$

$1.2\times10^5 + \frac{1}{2}(1.65)(275)^2 = P_2 + \frac{1}{2}(1.6$

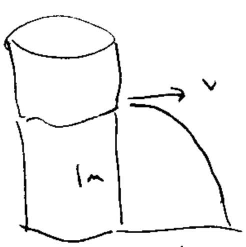
SO $P_2 =$ THIS WON'T WORK!

I CAN'T MIX cm/s & Pa!

$1.2\times10^5 + \frac{1}{2}(1650)(2.75)^2 = P_2 + \frac{1}{2}(1650$

$\boxed{P_2 = 2.64\times10^4\ Pa}$

(45) WHO CARES ABOUT THE SIZE OF THE HOLE? WE CAN USE PROJECTILE MOTION TO DETERMINE V AND THAT'LL TELL US h!



$X = .6$ $Y = 1$
$V_{ix} = V$ $V_{iy} = 0$
$V_{fx} = V$ $V_{fy} = ?$
$a_x = 0$ $a_y = 9.80$
$t = ?$

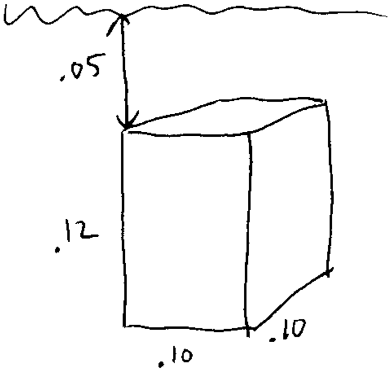
SO $t = \sqrt{\frac{2Y}{g}} = \sqrt{\frac{2}{9.8}} = .45\ s$

$V_{ix} = \frac{X}{t} = \frac{.6}{.45} = 1.3\ m/s$

AND $\rho g Y = \frac{1}{2}\rho v^2$

LEADS TO . . . $V = \sqrt{2gh}$ OR $h = \frac{v^2}{2g} = \frac{1.3^2}{2(9.8)} = .09\ m = 9\ cm$

(30) KINDA LIKE IN LECTURE . . .



$P_{TOP} = \rho g h = 1000(9.8)(.05) = 490 \text{ Pa}$

$F_{TOP} = P_{TOP} A_{TOP} = 490(.1)^2 = \boxed{4.9 N}$

$P_{BOT} = \rho g h = 1000(9.8)(.17) = 1666 \text{ Pa}$

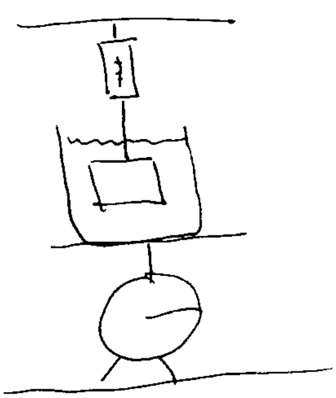
$\boxed{F_{BOT} = 16.66 N}$

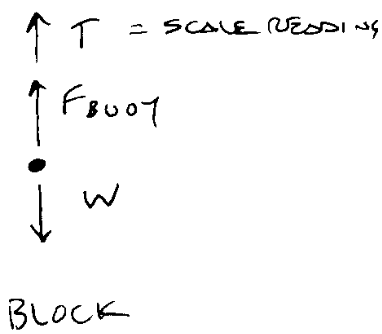
THE SCALE WILL READ $W - F_{BUOY} = 10\text{kg}(9.8) - \rho g \text{Vol}$

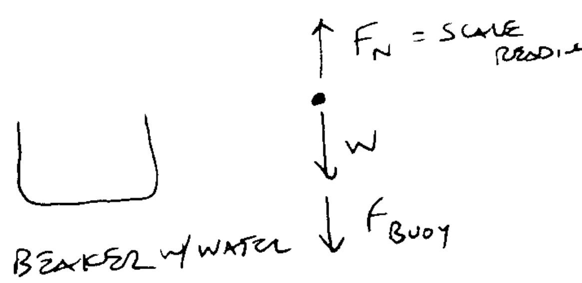
$98N - 11.76N = \boxed{86 N}$

$F_{BOT} - F_{TOP} = 11.76 N$
$F_{BUOY} = 11.76 N$ } WOW!

(39) WOW! THIS IS A COOL PROBLEM







BLOCK

$W = 2(9.8) = \boxed{19.6 N}$

$F_{BUOY} = \rho g \text{Vol} = (916)(9.8)\frac{m}{\rho} =$

$= (916)(9.8)\left(\frac{2.0}{7.86\times10^3}\right) = \boxed{2.28N}$

↑ FROM TABLE 9.3

SO $T = 19.6 - 2.28 = \boxed{17.3N}$

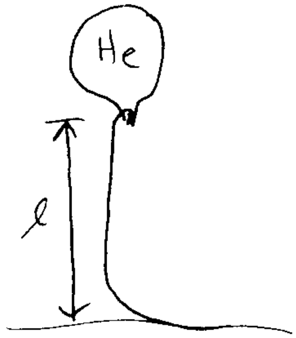
BEAKER

$W = (M_{OIL} + M_{BEAKER})g = (1+2)(9.8) = \boxed{29.}$

$F_{BUOY} = \boxed{2.28N}$

$F_N = 29.4 + 2.28 = \boxed{31.7 N}$

(78)



THE WHOLE STRING IS 2 m LONG AND .05 kg
SO THE STRING HAS A LINEAR DENSITY OF .025 kg/m

WE DID #33 IN CLASS BUT RECALL...

$\uparrow F_{BUOY} = \rho g Vol = (1.29)(9.8)(\tfrac{4}{3}\pi(.40)^3) = ~~10.57 N~~$ $3.39N$

$\downarrow W_{SKIN} = .25(9.8) = 2.45N$

$\downarrow W_{He} = .181(\tfrac{4}{3}\pi(.40)^3)(9.8) = .476 N$

$\downarrow W_{STRING} = ?$

$W_{STRING} = 3.39N - 2.45^N - .476^N = .463 N$

$M_{STRING} = .047 kg$

$.047 kg \left(\frac{m}{.025 kg}\right) = \boxed{1.89 m}$