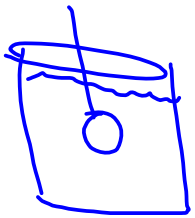
Fluid Handout

④ $m = 27.0\,kg$

$\rho = 2.70 \times 10^3 \frac{kg}{m^3}$



a) V

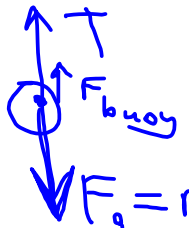
$\rho = \frac{m}{V} \Rightarrow V = \frac{m}{\rho} = \frac{27}{2700}$

$V = .01\,m^3$

check

$\frac{kg}{\frac{kg}{m^3}} = kg \cdot \frac{m^3}{kg}$

b)



$F_{buoy} = \rho V g = \left(1000 \frac{kg}{m^3}\right)(.01\,m^3)\left(9.8 \frac{m}{s^2}\right)$

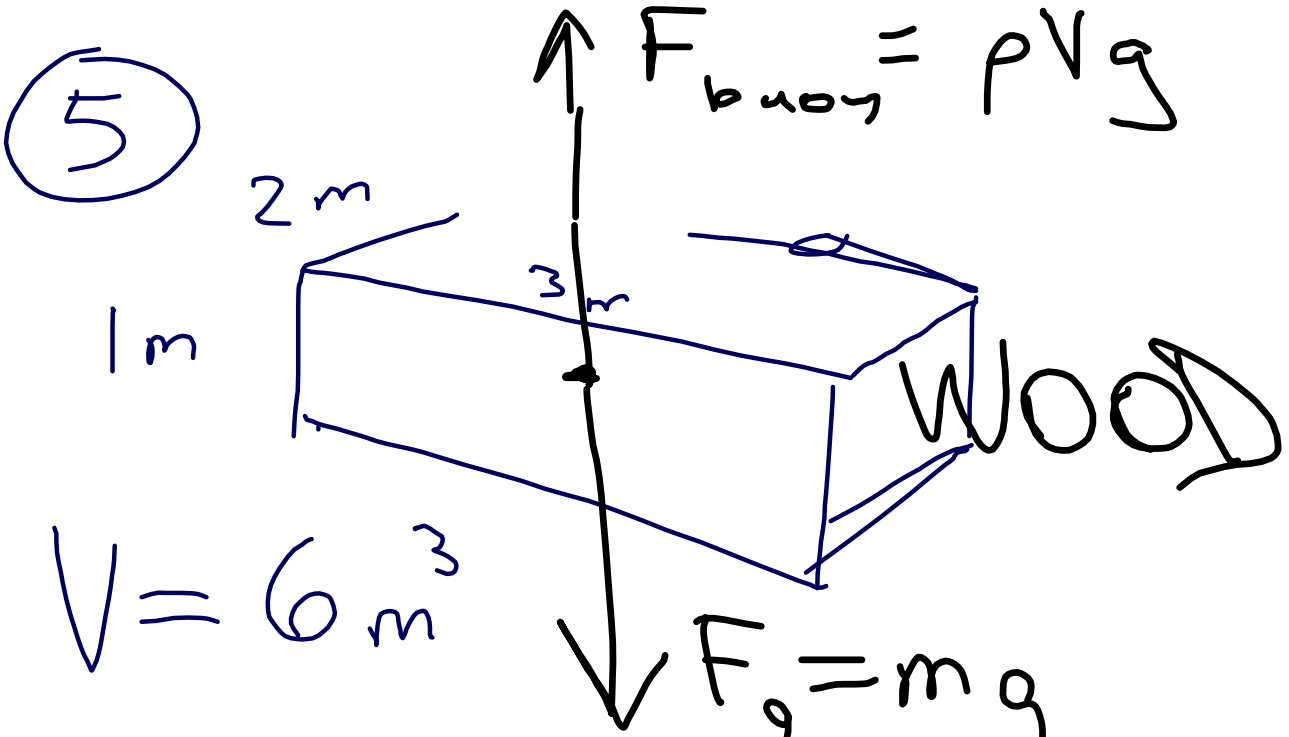
$1000 \frac{kg}{m^3}$

$\Sigma F = 0 = T + F_{buoy} - F_g$

ma

$T = F_g - F_{buoy}$

(5)



$\rho = 600 kg/m^3$ .6

b) $\rho_{H_2O} V = \rho_{wood} V + 700 kg$ People

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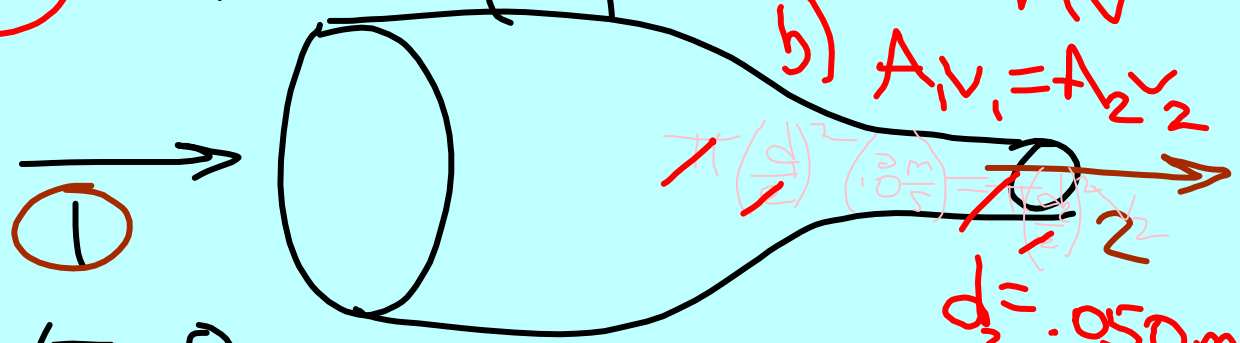
$A = \pi\left(\frac{d}{2}\right)^2$



$V = .8\ m/s$

a) $r = Av$

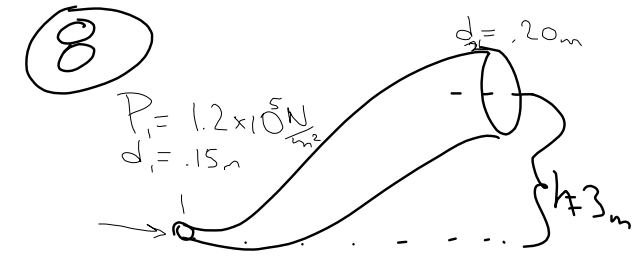
b) $A_1v_1 = A_2v_2$

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

$\left(1.01\times10^5\ \frac{N}{m^2}\right) + \frac{1}{2}\left(1000\ \frac{kg}{m^3}\right)\left(.8\ \frac{m}{s}\right)^2 =$

$P_2 + \frac{1}{2}\left(1000\ \frac{kg}{m^3}\right)\left(7.2\ \frac{m}{s}\right)^2$

8



$r = Av = .10\,\frac{m^3}{s}$

We'll need

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

1st off let's find v

$.10\,\frac{m^3}{s} = A_1 v_1$

$.10\,\frac{m^3}{s} = \pi\left(\frac{d_1}{2}\right)^2 v_1$

where $d_1 = .15\,m$

$\Rightarrow 5.65\,\frac{m}{s} = v_1$

$.10\,\frac{m^3}{s} = A_2 v_2$

$.10\,\frac{m^3}{s} = \pi\left(\frac{d_2}{2}\right)^2 v_2$

$v_2 = 3.18\,\frac{m}{s}$

We'll need

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

1st

$(1.2\times10^5)\,\frac{N}{m^2} + \frac{1}{2}\left(1000\,\frac{kg}{m^3}\right)\left(5.65\,\frac{m}{s}\right)^2 = P_2$

$+\frac{1}{2}(1000)(3.18)$

$+(1000)\left(9.8\,\frac{m}{s^2}\right)(3\,m)$

$\Rightarrow P = 1.07\times10^5\,\frac{N}{m^2}$

on the 89

solve(.... = ..., Variable)

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