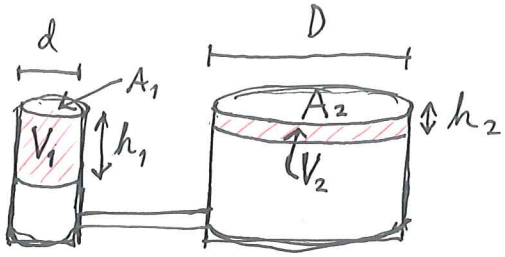
6.319+ $d = 0{,}020\,m$

$D = 0{,}15\,m$



a) $h_1 = 0{,}50\,m$

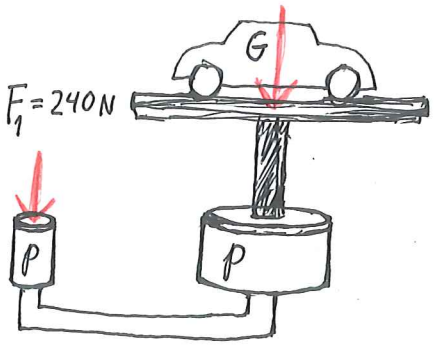
$V_2 = V_1$

$A_2 \cdot h_2 = A_1 \cdot h_1$

$$h_2 = \frac{A_1}{A_2} \cdot h_1 = \frac{\pi r_1^2}{\pi r_2^2} \cdot h_1 = \frac{\left(\frac{d}{2}\right)^2}{\left(\frac{D}{2}\right)^2} \cdot h_1 = \frac{d^2}{D^2} \cdot h_1$$

$$= \left(\frac{0{,}020\,m}{0{,}15\,m}\right)^2 \cdot 0{,}50\,m = 8{,}888 \cdot 10^{-3}\,m = \underline{8{,}9\,mm}$$

b)



$$p = \frac{F_1}{A_1} = \frac{G}{A_2}$$

$$\frac{A_2 \cdot F_1}{A_1} = G \qquad \text{og } G = mg$$

$$m = \frac{A_2 \cdot F_1}{A_1 \cdot g}$$

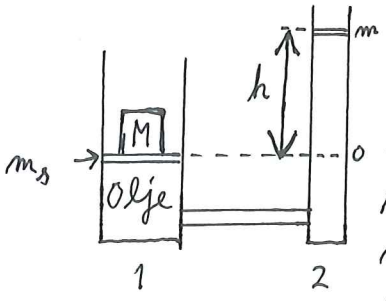
$$m = \frac{\pi r_2^2 \cdot F_1}{\pi r_1^2 \cdot g} = \frac{D^2 \cdot F_1}{d^2 \cdot g} = \frac{(0{,}15\,m)^2 \cdot 240\,N}{(0{,}020\,m)^2 \cdot 9{,}81\,\frac{m}{s^2}}$$

$$= 1376\,kg = \underline{1{,}4 \cdot 10^3\,kg}$$

c) $W = F \cdot s = F_1 \cdot h_1 = 240\,N \cdot 0{,}50\,m = 120\,J = \underline{0{,}12\,kJ}$

d) $W = F \cdot s = mgh_2 = 1376\,kg \cdot 9{,}81\,\frac{m}{s^2} \cdot 8{,}888 \cdot 10^{-3}\,m = 119{,}9\,J = \underline{0{,}12\,kJ}$

6.320+



$h = 1{,}00\,m$

$\rho = 800\,\frac{kg}{m^3}$

$A_1 = 0{,}50\,m^2$

$A_2 = 1{,}00 \cdot 10^{-4}\,m^2$

$m_s = 51\,kg$

$m = ?$

$M = 510\,kg$ $\quad p = \frac{F_1}{A_1} = \frac{F_2}{A_2}$

Trykket opp grunnet det tunge loddet og det tunge stempelet er lik trykket ned grunnet oljesøylen og det lette stempelet i høyden null.

$$p = \frac{(M + m_s)g}{A_1} = \frac{(m + \rho A_2 h)g}{A_2}$$

$$\frac{A_2}{A_1}(M + m_s) = m + \rho A_2 h$$

$$m = \frac{A_2}{A_1}(M + m_s) - \rho A_2 h$$

$$m = \frac{1{,}00 \cdot 10^{-4}\,m^2}{0{,}50\,m^2} \cdot (510 + 51)\,kg - 800\,\frac{kg}{m^3} \cdot 1{,}00 \cdot 10^{-4}\,m^2 \cdot 1{,}00\,m = 0{,}0322\,kg = \underline{32\,g}$$

6.333+

lastevolum $V_l = 3{,}0\,m^3$

$\rho_l = 0{,}90\,\frac{kg}{dm^3}$

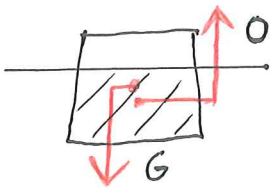
$\sum F = 0$ ekstra krefter på båten etter at lasten er om bord.

$m_l \cdot g - \rho_v \cdot V_{FV} \cdot g = 0$

$\rho_l \cdot V_l = \rho_v \cdot V_{FV}$

$V_{FV} = \frac{\rho_l}{\rho_v} \cdot V_l = \frac{0{,}90\,\frac{kg}{dm^3}}{1{,}025\,\frac{kg}{dm^3}} \cdot 3{,}0\,m^3 = \underline{2{,}6\,m^3}$

6.334+ $\frac{9}{10}$ av volumet under vann på jorda.



$\sum F = 0$

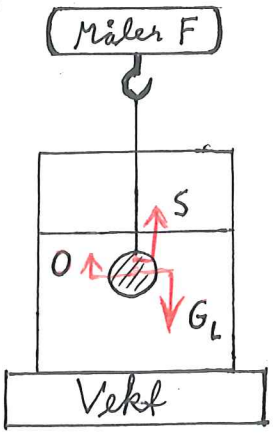
$G - O = 0$

$mg = \rho_v \cdot V_{FV} \cdot g$

$\rho_{is} \cdot V_{is} = \rho_v \cdot V_{FV}$ 2)

$\frac{\rho_{is}}{\rho_v} = \frac{V_{FV}}{V_{is}}$ Vi ser at g ikke har noen betydning.

6.335+



$M_{vann} = 0{,}510\,kg$

$G_L = 8{,}73\,N$

$\Delta V = (413 - 300)\,ml = 113 \cdot 10^{-3}\,dm^3$

$\sum F = 0$

$S + O = G_L$

$S = G_L - O = G_L - \rho_v \cdot \Delta V \cdot g$

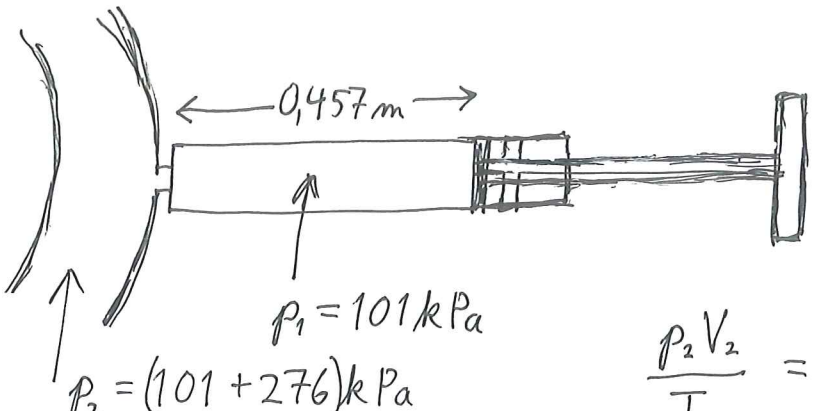
Kraftmåleren: $= 8{,}73\,N - 0{,}998\,\frac{kg}{dm^3} \cdot 113 \cdot 10^{-3}\,dm^3 \cdot 9{,}81\,\frac{m}{s^2}$

$= 7{,}6236\,N = \underline{7{,}62\,N}$

Vekta viser tyngden av vannet + tyngden av det forstrengte vannet.

$M_{vann} + \rho_v \cdot \Delta V = 0{,}510\,kg + 0{,}998\,\frac{kg}{dm^3} \cdot 113 \cdot 10^{-3}\,dm^3 = \underline{0{,}623\,kg}$

6.360+



$$\frac{p_2 V_2}{T_2} = \frac{p_1 V_1}{T_1} \quad \text{og} \quad T_1 = T_2$$

$$p_2 V_2 = p_1 V_1$$

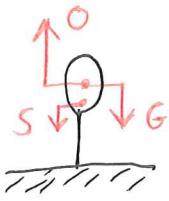
$$p_2 \cdot A \cdot x_2 = p_1 \cdot A \cdot x_1$$

$$x_2 = \frac{p_1}{p_2} \cdot x_1 = \frac{101\,kPa}{377\,kPa} \cdot 0{,}457\,m = 0{,}122\,m$$

Endring i x:

$$\Delta x = x_1 - x_2 = (0{,}457 - 0{,}122)\,m = 0{,}335\,m = \underline{33{,}5\,cm}$$

6.366 $V_0 = 40\,m^3$ $T = 273\,K$ $p_0 = 101{,}3\,kPa$



a) $p_0 V_0 = N k T_0$

$$N = \frac{p_0 V_0}{k T_0} = \frac{101{,}3 \cdot 10^3 \frac{N}{m^2} \cdot 40\,m^3}{1{,}38 \cdot 10^{-23} \frac{J}{K} \cdot 273\,K} = 1{,}075 \cdot 10^{27} = \underline{1{,}1 \cdot 10^{27}}$$

b) $$O = \rho_L \cdot V_{FL} \cdot g = 1{,}29 \frac{kg}{m^3} \cdot 40\,m^3 \cdot 9{,}81 \frac{m}{s^2} = 506\,N = \underline{0{,}51\,kN}$$

c) $\sum F = ma$ og $s = 0$

$$O - G = ma$$

$$a = \frac{O - mg}{m} = \frac{506\,N - 20\,kg \cdot 9{,}81 \frac{m}{s^2}}{20\,kg} = (25{,}3 - 9{,}81) \frac{m}{s^2} = \underline{15 \frac{m}{s^2}}$$

d) $p_1 = 50{,}0\,kPa$ $T = T_0$

$$\frac{p_1 V_1}{T_1} = \frac{p_0 V_0}{T_0}$$

$$V_1 = \frac{p_0}{p_1} \cdot V_0 = \frac{101{,}3\,kPa}{50{,}0\,kPa} \cdot 40\,m^3 = \underline{81\,m^3} \quad (81{,}04\,m^3)$$

e) $T_2 = (273 - 30)\,K = 243\,K$

$$\frac{p_2 V_2}{T_2} = \frac{p_1 V_1}{T_1} \quad \text{og} \quad p_2 = p_1$$

$$V_2 = \frac{T_2}{T_1} \cdot V_1 = \frac{243\,K}{273\,K} \cdot 81{,}04\,m^3 = \underline{72\,m^3}$$

f)