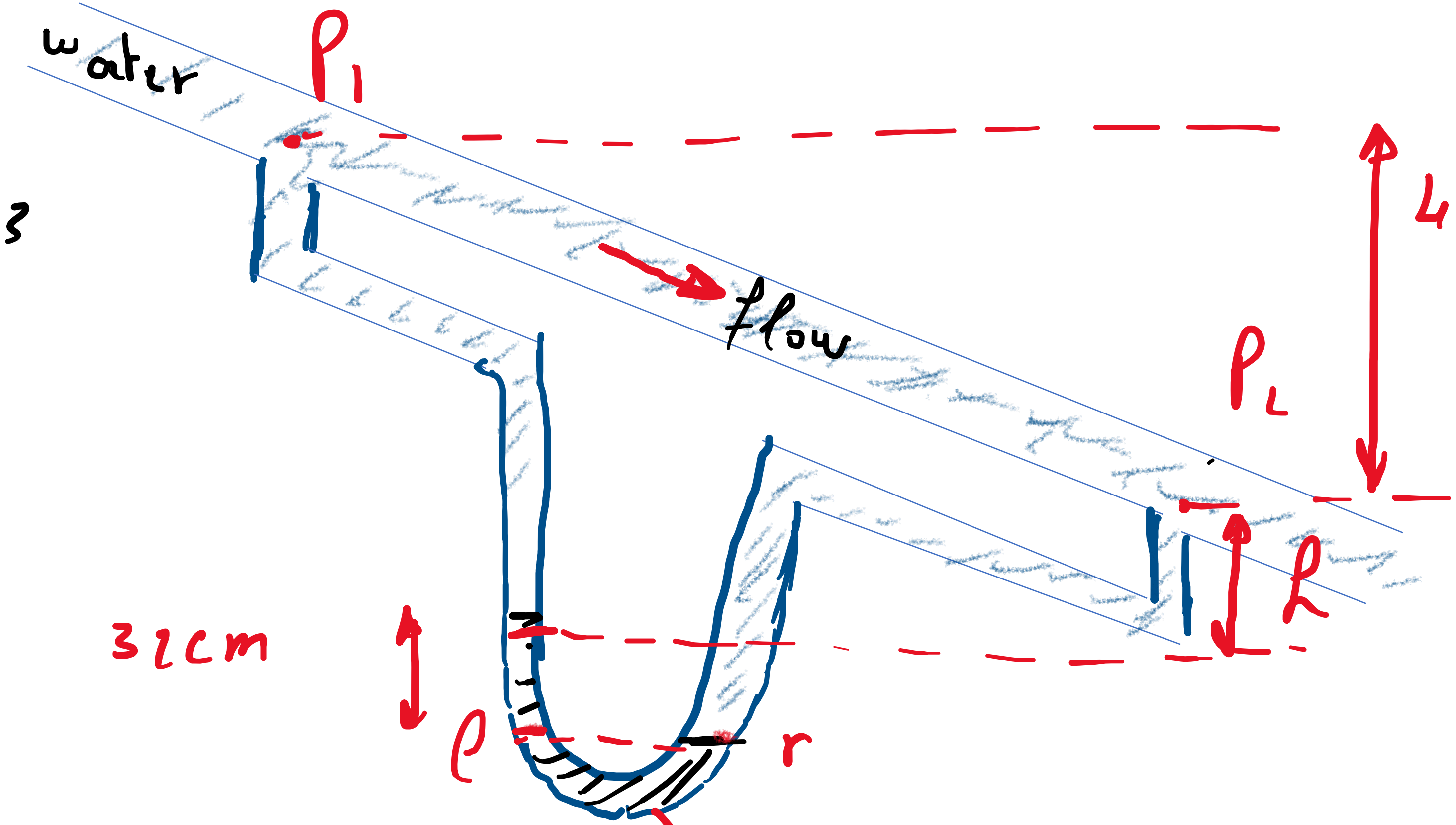
Ex:

$$\frac{P}{\gamma} + z + \frac{v^2}{2g} = const.$$

$\rho_w = 1000 \, Kg/m^3$



$\rho_{oil} = 900 \, Kg/m^3.$

$P_1 - P_2 = ??$

$$P_l = P_1 + \gamma_w (0.04 + h) + \gamma_{oil} (0.32).$$

$$P_l = P_1 + \gamma_w(0.04 + h) + \gamma_{oil}(0.32).$$

$$P_r = P_2 + \gamma_w(0.32 + h).$$

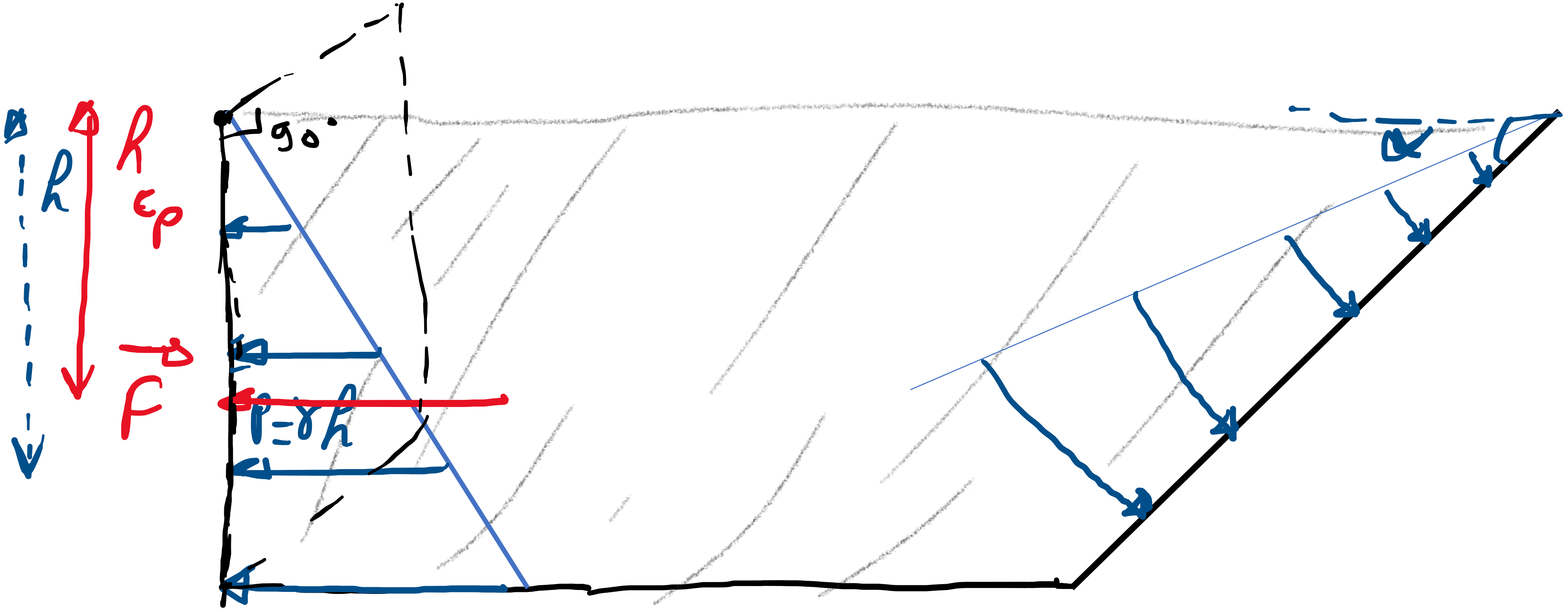
$$P_l = P_r \Rightarrow P_1 + \gamma_w(0.04) + \cancel{\gamma_w h} + \gamma_{oil}(0.32) = P_2 \cancel{+ \gamma_w h}$$

$$+ \gamma_w 0.32$$

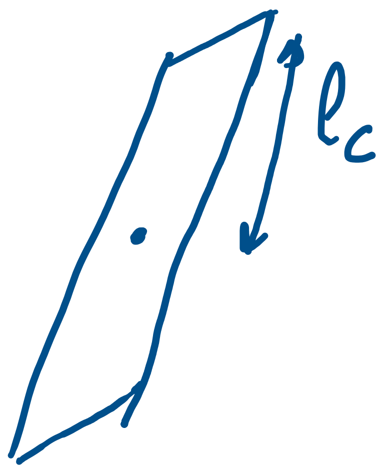
$$P_1 - P_2 = \gamma_w(0.32 - 0.04) - \gamma_{oil}(0.32)$$

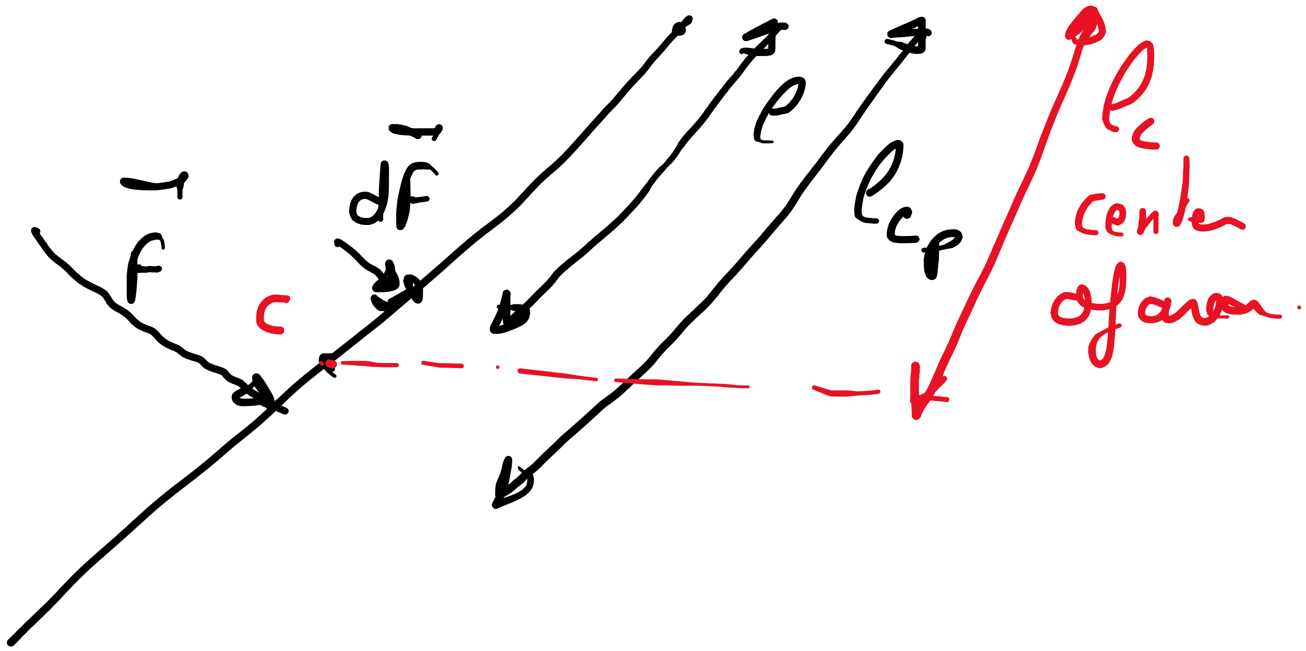
$$\approx -3.5 \text{ kPa}.$$

3_ Pressure force on a plane surface:



$dF = P dA.$


l_c


$\vec{F}$
$d\vec{F}$
c
l
l_{cp}
l_c
center
of area

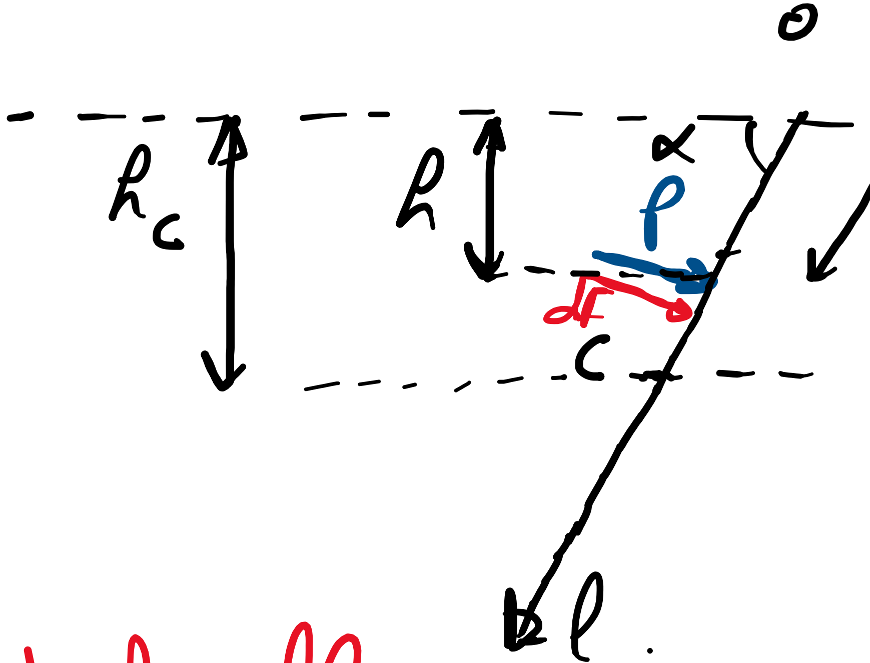
$p = \gamma h.$

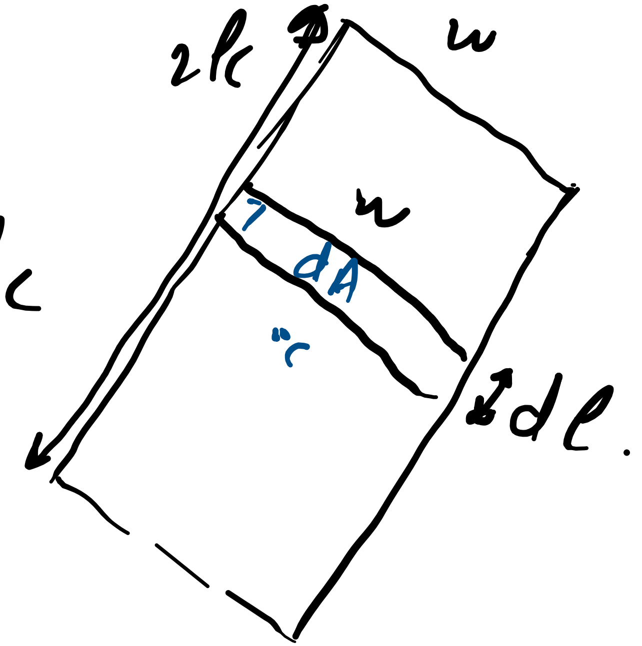
$dF = p \cdot dA$

$dA =$ element of area

$dA = dl \cdot w.$

with $w =$ width of wall.

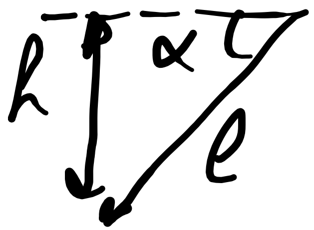




$$A = w(2l_c).$$

$$0 < l \leq 2l_c.$$

$$p = \gamma h = \gamma l \sin\alpha.$$



$$\sin\alpha = \frac{h}{l}.$$

$$h = l \sin\alpha.$$

$$p = \gamma h = \gamma \ell \sin\alpha$$

$$dF = p\,dA = (\gamma \ell \sin\alpha)\, w\, d\ell.$$

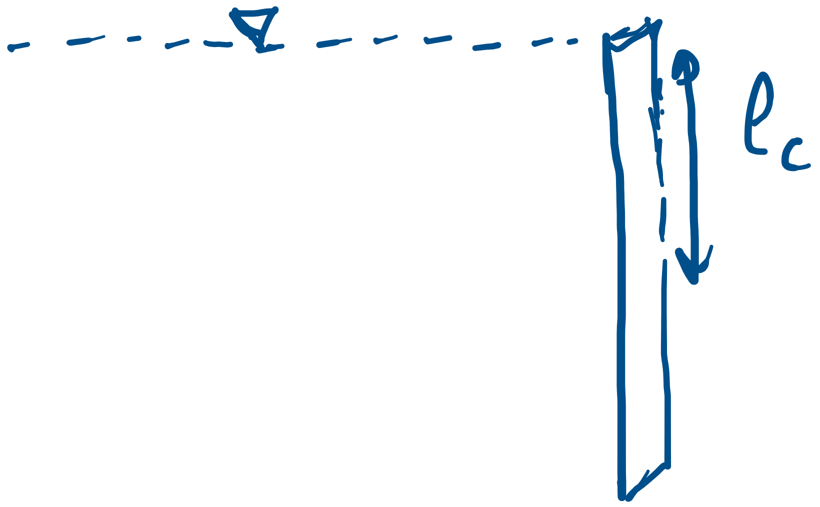
$$\int_0^F dF = \int_0^{2\ell_c} (\sin\alpha)\gamma \quad \ell \quad \underbrace{w}_{\text{width}}\, d\ell.$$

$$F = (\sin\alpha)\gamma w \int_0^{2\ell_c} \ell\, d\ell = \gamma \sin\alpha\, (w) \left[\frac{\ell^2}{2}\right]_0^{2\ell_c} = \gamma \sin\alpha\, w \frac{4\ell_c^2}{2}$$

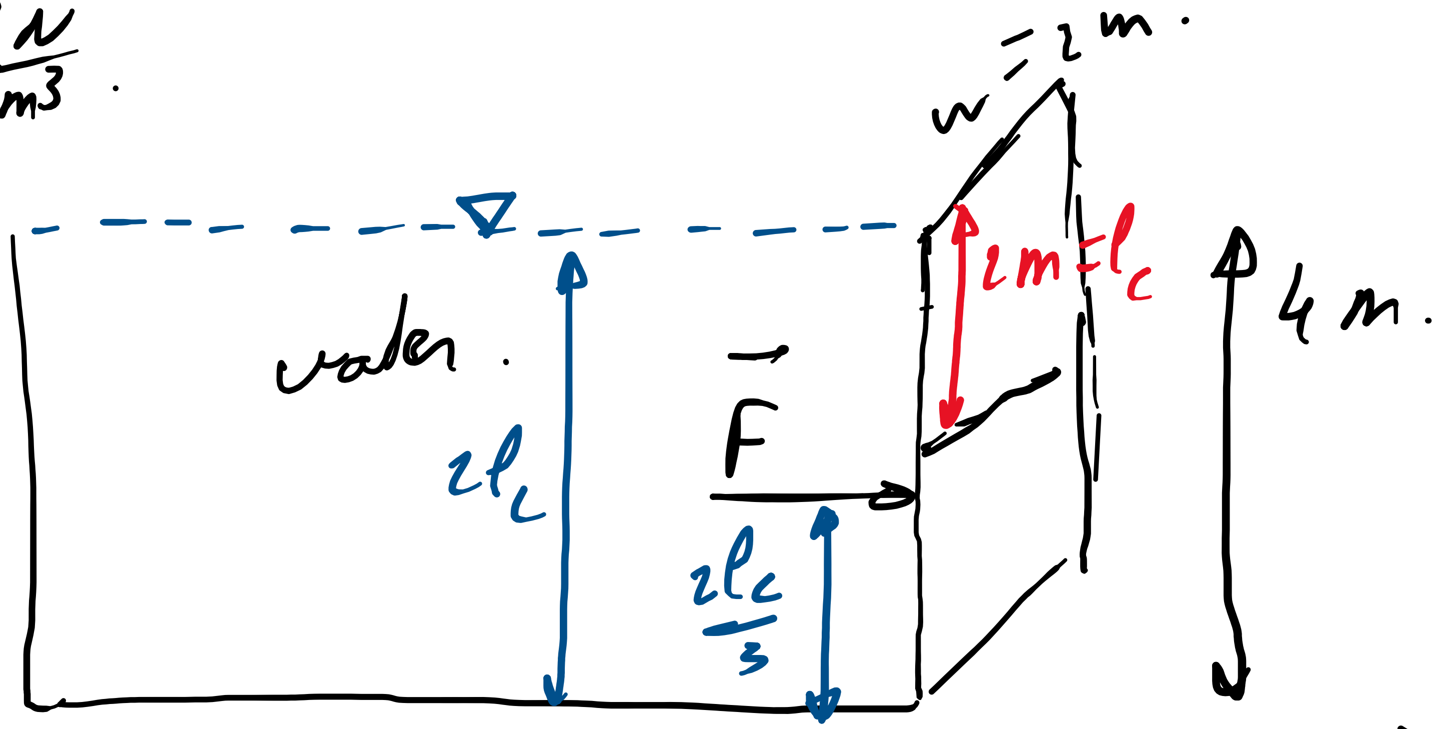
$$F = \sin\alpha\,(\gamma)\left[\underbrace{w\, 2\ell_c}_{A}\right].\ell_c = (\sin\alpha)\gamma\, \ell_c \cdot A.$$

$$F = (\sin\alpha)\,\underbrace{\gamma\, l_c\, A}\,.$$

specific weight x position of center x Area
of area of wall.



$\gamma_w = 9.8 \times 10^3 \frac{N}{m^3}$.



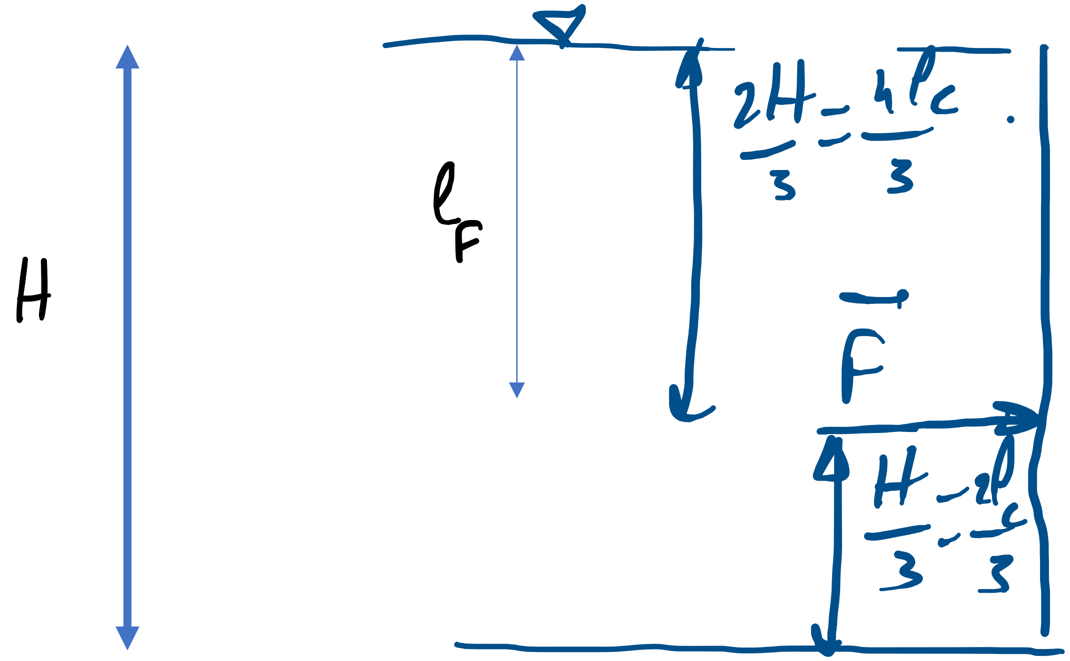
$A = 8\,m^2$.

$\ell_c = 2m$.

$F = \gamma \cdot \ell_c \times A$.

$= 9.81 \times 10^3 \times 2 \times 8 = 1.568 \times 10^5\,N$.

location of force.



$2l_c = H$.

$$l_F = \frac{2}{3}H = \frac{2}{3}2l_c = \frac{4}{3}\,l_c.$$