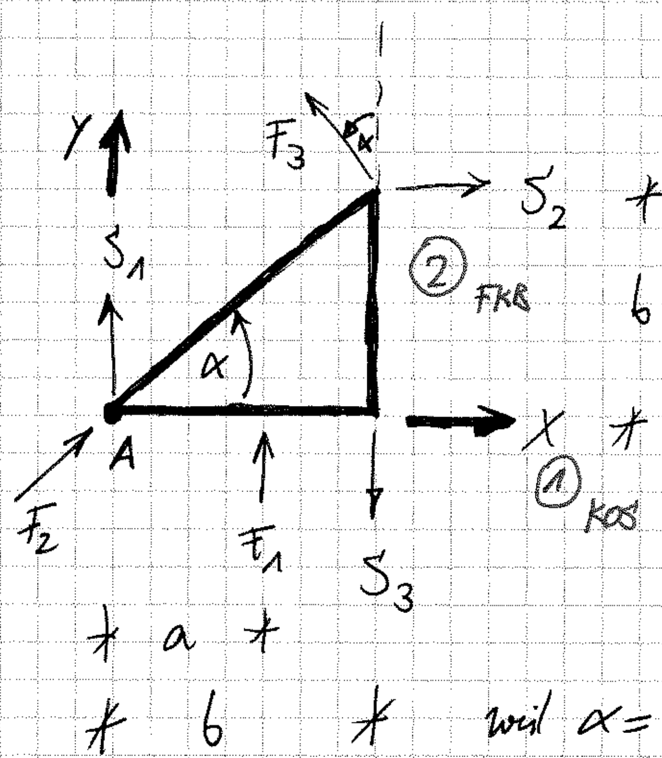
1.



weil $\alpha = 45°$

$$\rightarrow: \quad S_2 - F_3 \sin\alpha + F_2 \cos 45° = 0 \qquad (2)$$

$$\sin\alpha = \cos 45° = \tfrac{1}{2}\sqrt{2}$$

$$S_2 = F_3 \cdot \tfrac{1}{2}\sqrt{2} - F_2 \tfrac{1}{2}\sqrt{2} = \tfrac{1}{2}\sqrt{2}\,(F_3 - F_2) \qquad (2)$$

$$\curvearrowright A: \quad S_2 b - F_3 \sqrt{2}\, b + S_3 b - F_1 a = 0 \qquad (2)$$

$$S_3 = F_1 \frac{a}{b} + \sqrt{2} F_3 - S_2$$

$$= F_1 \frac{a}{b} + \sqrt{2} F_3 - \tfrac{1}{2}\sqrt{2}\,(F_3 - F_2)$$

$$= \frac{a}{b} F_1 + \tfrac{1}{2}\sqrt{2} F_2 + \tfrac{1}{2}\sqrt{2} F_3 \qquad (2)$$

$$\uparrow: \quad S_1 + \tfrac{1}{2}\sqrt{2} F_2 + F_3 \tfrac{1}{2}\sqrt{2} - S_3 + F_1 = 0 \qquad (2)$$

$$S_1 = +S_3 - F_1 - \tfrac{1}{2}\sqrt{2} F_2 - \tfrac{1}{2}\sqrt{2} F_3$$

$$= \frac{a}{b} F_1 - F_1 = \left(\frac{a}{b} - 1\right) F_1 \qquad (2)$$

2.

$$y_s = \sum_i y_i A_i \cdot \frac{1}{\sum_i A_i}$$

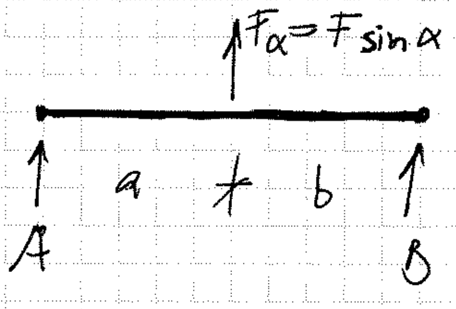
	y_i	A_i	
$i=1$	$\frac{b}{2}$ (2)	$+a \cdot b$ (2)	
$i=2$	$\frac{b}{2}$ (2)	$+\frac{1}{32}\pi b^2$ (2)	
$i=3$	$b - \frac{4}{21}\frac{a}{\pi}$ (3)	$-\frac{1}{98}\pi a^2$ (3)	

$$\rightarrow y_s = \frac{1}{A}\left[\frac{1}{2}ab^2 + \frac{1}{64}\pi b^3 - \left(b - \frac{4}{21}\frac{a}{\pi}\right)\cdot\frac{1}{98}\pi a^2\right]$$

$$\text{mit } A = ab + \frac{1}{32}\pi b^2 - \frac{1}{98}\pi a^2 \quad (1)$$

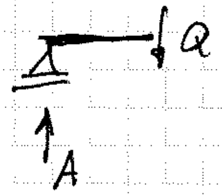
3.

i)

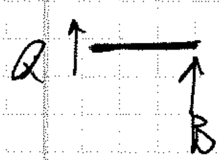


$\curvearrowright B: \quad A(a+b) + F_\alpha b = 0 \Rightarrow A = -\dfrac{F b \sin\alpha}{a+b}$

$\curvearrowright A: \quad -B(a+b) - F_\alpha a = 0 \Rightarrow B = -\dfrac{F a \sin\alpha}{a+b}$

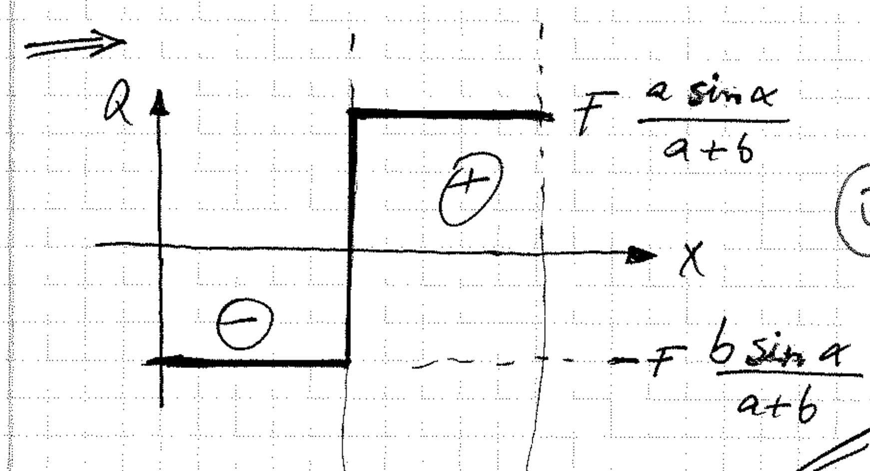


$Q = A = -F\dfrac{b\sin\alpha}{a+b}$ (1)



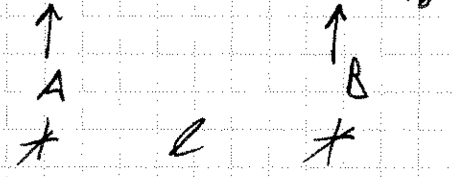
$Q = -B = F\dfrac{a\sin\alpha}{a+b}$ (1)

$\Rightarrow$



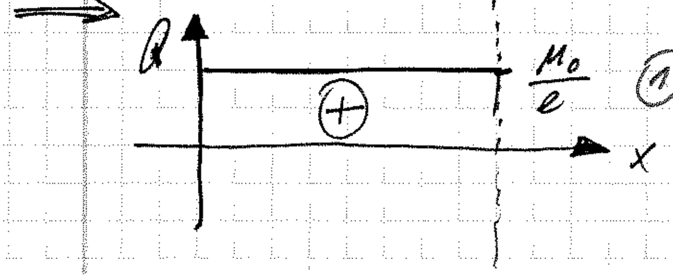
(3)

ii)



$A = \dfrac{M_0}{l}$; $B = -\dfrac{M_0}{l}$ (2)

$\Rightarrow$

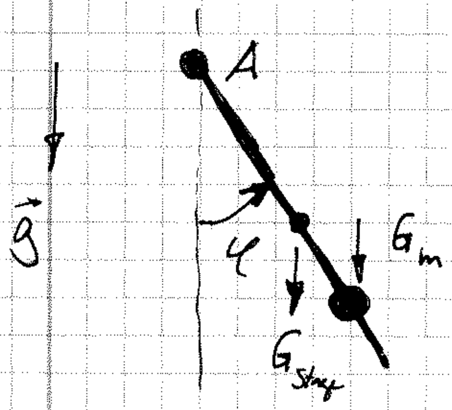


(1)

3/4

4. $\Theta_A^{Stang} = \frac{1}{3} m \ell^2$ (2) ; $\Theta_A^{\bullet} = m a^2$ (1)

$$\Rightarrow \Theta_A = \Theta_A^{Stang} + \Theta_A^{\bullet} = m\left(\frac{\ell^2}{3} + a^2\right)$$



$$\curvearrowright A: \quad \Theta_A \ddot{\varphi} = \left(G_{Stang} \cdot \frac{\ell}{2} + G_m \cdot a\right)(-\sin\varphi)$$ (1) (1) (1)

• für kleine $\sphericalangle$: $\sin\varphi \cong \varphi$ (1)

$$\rightarrow \Theta_A \ddot{\varphi} + G_{Stang} \cdot \frac{\ell}{2} \varphi + G_m \cdot a \varphi = 0$$

$$\cancel{m}\left(\frac{\ell^2}{3} + a^2\right)\ddot{\varphi} + \cancel{m} g \frac{\ell}{2} \varphi + \cancel{m} g a \varphi = 0$$

(2) $$\ddot{\varphi} + \underbrace{\left[\frac{g\ell}{2\left(\frac{\ell^2}{3} + a^2\right)} + \frac{g a}{\frac{\ell^2}{3} + a^2}\right]}_{=: \omega^2} \varphi = 0$$

(1) $$\Rightarrow \omega^2 = g\left[\frac{\frac{\ell}{2} + a}{\frac{\ell^2}{3} + a^2}\right]$$

$$= g\left[\frac{3\ell + 6a}{2\ell^2 + 6a^2}\right]$$

$\omega_{min}^2 = \frac{3}{2}\frac{g}{\ell}$ (1)

$\omega_{max}^2 = \frac{9}{8}\frac{g}{\ell}$ (1)

4/4