

Opgave 2

$$m_p := 100 \text{ kg}$$

$$k_G := 0.25 \text{ m}$$

$$r_G := 0.75 \text{ m}$$

$$\omega_p := 4 \frac{\text{rad}}{\text{s}}$$

$$a_g := 9.81 \frac{\text{m}}{\text{s}^2}$$

a) Masseinertimoment om G

$$I_G := k_G^2 \cdot m_p = 6.25 \text{ kg} \cdot \text{m}^2$$

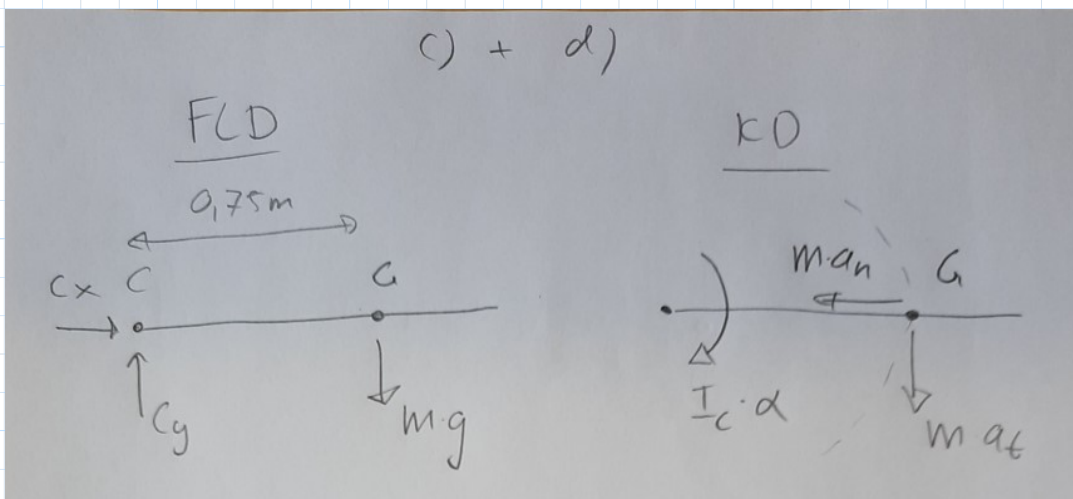
$$I_G = 6.25 \text{ kg} \cdot \text{m}^2$$

b) Masseinertimoment om C

$$I_C := I_G + m_p \cdot r_G^2 = 62.5 \text{ kg} \cdot \text{m}^2$$

$$I_C = 62.5 \text{ kg} \cdot \text{m}^2$$

c) + d)



e) Vinkelacceleration

$$\alpha_p := \frac{r_G \cdot m_p \cdot a_g}{I_C} = 11.772 \frac{1}{s^2}$$

$$\alpha_p = 11.77 \frac{\text{rad}}{s^2}$$

e) Vinkelacceleration

$$\sum \vec{M}_C = I_C \cdot \alpha : -0.75 \text{ m} \cdot 100 \text{ kg} \cdot 9.81 \text{ m/s}^2 = -62.5 \text{ kg m}^2 \cdot \alpha$$

$$\alpha = \frac{0.75 \text{ m} \cdot 100 \text{ kg} \cdot 9.81 \text{ m/s}^2}{62.5 \text{ kg m}^2} \Rightarrow \alpha = 11.77 \text{ rad/s}^2$$

f) Reaktorer på pendulet

$$C_x := -m_p \cdot r_G \cdot \omega_p^2 = -1.2 \cdot 10^3 \text{ N}$$

$$C_x = -1200 \text{ N}$$

$$C_y := -m_p \cdot (r_G \cdot \alpha_p) + m_p \cdot a_g = 98.1 \text{ N}$$

$$C_y = 98.1 \text{ N}$$

g) Reaktorer

$$\sum \vec{F}_x = m \cdot a_x : C_x = -m \cdot r \cdot \omega^2 = -100 \text{ kg} \cdot 0.75 \text{ m} \cdot (4 \text{ rad/s})^2$$

$$\Rightarrow C_x = -1200 \text{ N} \quad (\text{mod venstre})$$

$$\sum F_y = m \cdot a_y : C_y - m \cdot g = -m \cdot a_t$$

$$C_y = -m \cdot a_t + m \cdot g = -m \cdot \underbrace{(r \cdot \alpha)}_{a_t} + m \cdot g$$

$$C_y = -100 \text{ kg} \cdot 0.75 \text{ m} \cdot 11.77 \text{ rad/s}^2 + 100 \text{ kg} \cdot 9.81 \text{ m/s}^2$$

$$\Rightarrow C_y = 98.1 \text{ N} \quad (\text{op ad})$$

(Statisk reaktion blot til sammenligning)

$$C_{\text{statisk}} := m_p \cdot a_g = 981 \text{ N}$$

g) Rammens reaktioner

$$A_x := -1200 \text{ N} = -1.2 \cdot 10^3 \text{ N}$$

$$A_x = -1200 \text{ N}$$

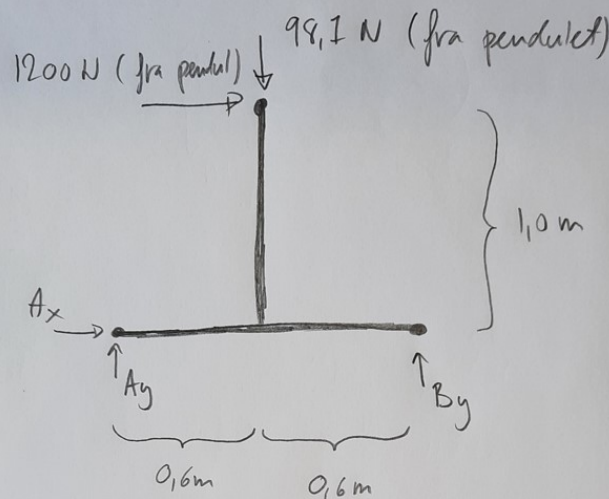
$$B_y := \frac{1200 \text{ N} \cdot 1 \text{ m} + 98.1 \text{ N} \cdot 0.6 \text{ m}}{1.2 \text{ m}} = (1.049 \cdot 10^3) \text{ N}$$

$$B_y = 1049.1 \text{ N}$$

$$A_y := C_y - B_y$$

$$A_y = -950.95 \text{ N}$$

g) Rammens reaktioner



$$\sum \vec{F}_x = 0, \text{ statisk: } A_x + 1200 \text{ N} = 0$$

$$\Rightarrow A_x = -1200 \text{ N}$$

$$\sum \vec{M}_A = 0, \text{ statisk: } B_y \cdot 1.2 \text{ m} - 1200 \text{ N} \cdot 1.0 \text{ m} - 98.1 \text{ N} \cdot 0.6 \text{ m} = 0$$

$$B_y = \frac{1200 \text{ N} \cdot 1.0 \text{ m} + 98.1 \text{ N} \cdot 0.6 \text{ m}}{1.2 \text{ m}} \Rightarrow B_y \approx 1049 \text{ N}$$

$$\sum F_y = 0, \text{ statisk: } A_y - 98.1 \text{ N} + B_y = 0$$

$$A_y = 98.1 \text{ N} - B_y = 98.1 \text{ N} - 1200 \text{ N}$$

$$\Rightarrow A_y \approx -951 \text{ N}$$