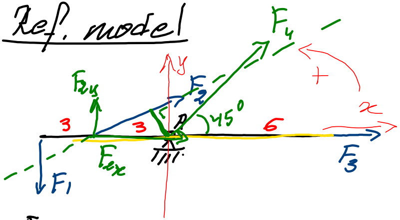
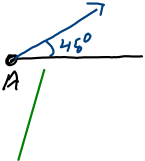
13

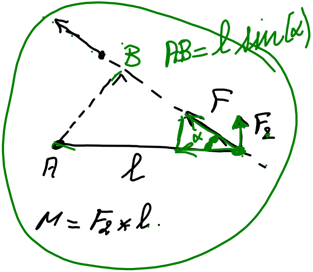
# Ref. model




$\sum M_A(\vec{F}) = 0$

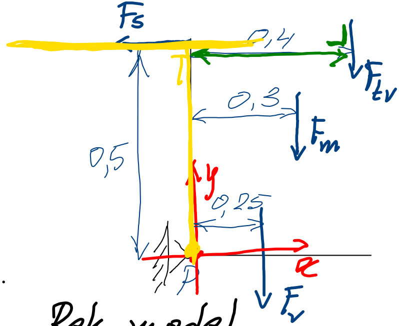
$F_1 * 0{,}06 - F_2\cos(60^\circ)\cdot 0{,}03 + F_3 * 0$



(14)

# Ref. model




## Rek. model

$$\sum M_P(\vec{F}) = 0$$

$$F_s \cdot \sin(90^\circ) * 0{,}5 - F_{tv} * 0{,}4 - F_m * 0{,}3 - F_v * 0{,}25 = 0$$

$$F_{tv} = m_{tv} * g$$

massa deeltjes → versnellen  E toevoegen

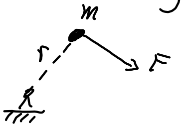
massa deeltjes → vertragen  E afvoeren

$F = m * a$ 

Effect van massa op afstand.

↓

bepaald de traagheid.

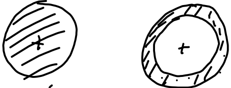



$F * r = I \alpha$

$\left[\frac{kg\, m}{s^2} * m\right] = I * \left[\frac{rad}{s^2}\right]$

$I = [kg\, m^2]$

$\boxed{\sum M = I \alpha}$



wals wiel

# Welk object is het makkelijkst in beweging te brengen

↓

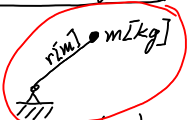
wiel

Waarom?

invloed van massa.

massatraagheidsmoment = $I$

$$\boxed{I = m * r^2\ [kgm^2]}$$



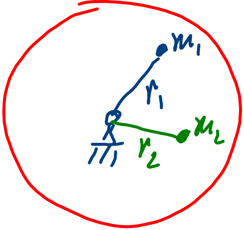

Om in beweging te brengen

↓

$\alpha\ [rad/s^2]$

↓

$M = \tau = I\alpha\ [Nm]$.



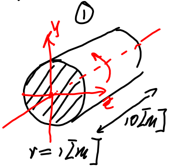

$$\left.\begin{array}{l} I_1 = m_1 r_1^2 \\ I_2 = m_2 r_2^2 \\ \vdots \end{array}\right\}$$

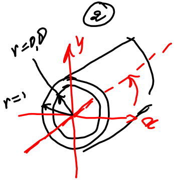
---

$$I_{figuur}$$

Vb

$\rho = 7860\,[kg/m^3]$




$V_1 = \pi r^2 * l$

$V_1 = \pi \cdot 1^2 * 10 = 31{,}4\,[m^3]$

$V_2 = V_1 - \pi \cdot 0{,}8^2 * 10$

$V_2 = 11{,}3\,[m^3]$

$m_1 = V_1 * \rho$

$= 31{,}4 * 7860$

$m_1 = 246804\,[kg]$

$m_2 = 11{,}3 * 7860$

$m_2 = 88895\,[kg]$

$I_1 = \frac{1}{2} m r^2$

$= \frac{1}{2} \cdot 246804 \cdot 1^2$

$I_1 = 123402\,[kgm^2]$

$I_2 = \frac{1}{2} m (r_1^2 + r_2^2)$

$= \frac{1}{2} \cdot 88895 (1^2 + 0{,}8^2)$

$= 72893\,[kgm^2]$

Stel $\alpha = 1\,[rad/s^2]$

$\Downarrow \boxed{\tau = I * \alpha}$

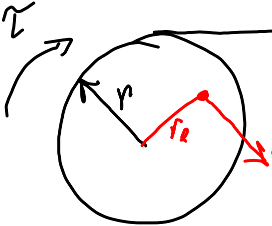
$\tau_1 = 123402\,[Nm]$

$\tau_2 = 72893\,[Nm]$

$\Downarrow \boxed{\tau = F * r}$

$F_1 = 123402\,[N]$

$F_2 = 72893\,[N]$

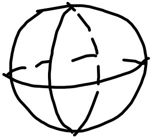



$$F = \frac{\tau}{r}$$

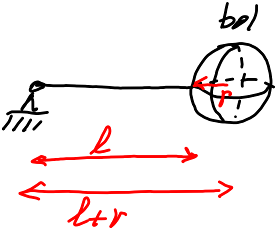
$$\downarrow$$

$$F_2 = \frac{\tau}{r_2}$$

## Vb



$I=\frac{2}{5}mr^2$




## Verschuivingswet van Steiner.

$I_{bol} = \frac{2}{5}mr^2$ 25

$I_{steiner} = m*R^2 = \underbrace{m*(l+r)^2}_{I_{totaal}} + \frac{12}{37}$

zwaartepunt bol in draaipunt

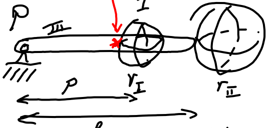
$$I = \frac{2}{5} m r^2 .$$


$$I_{bol} = \frac{2}{5} m r^2$$

$$I_{staaf} = \frac{1}{12} m l^2 \quad +$$

$$I_{object} = \ldots$$

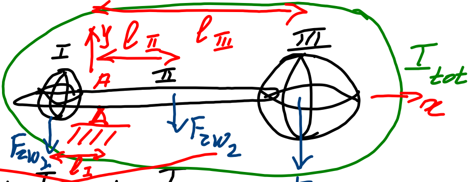
zwaartepunt staaf




afstand zwaarte punt tot draaipunt

| | EIGEN | Steiner $= m * r^2$ | |
|---|---|---|---|
| III staaf | $\frac{1}{12} m_{III} l^2$ | $+ m_{III} * \left(\frac{l}{2}\right)^2$ | $= \ldots$ |
| I | $\frac{2}{5} m_I r_I^2$ | $+ m_I p^2$ | $= \ldots$ |
| II | $\frac{2}{5} m_{II} r_{II}^2$ | $+ m_{II} * (l + r_{II})^2$ | $= \ldots \quad +$ |

$$I_{tot} = \ldots$$




$$\cancel{-I_I + I_{II} + I_{III}}$$

$$\boxed{I_I + I_{II} + I_{III}} = I_{tot}$$

$\downarrow$

verdeling van massa om een draaipunt

$\downarrow$

$$\tau = I_{tot} * \alpha$$

$$\Sigma M_A = I_{tot} * \alpha .$$

$$F_{zw_I} * l_I - F_{zw_{II}} * l_{II} - F_{zw_{III}}\, l_{III} = I_{tot} * \alpha$$