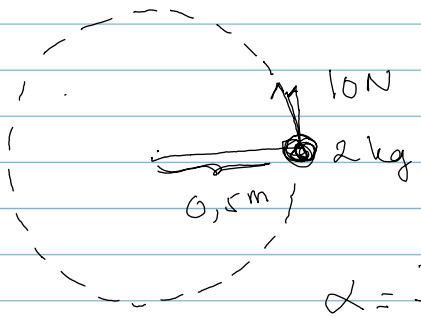
#1

Menghitung momen inersia



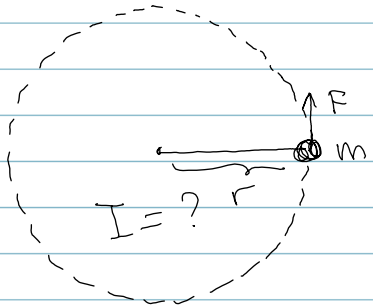
$a = \frac{10}{2} = 5 \text{ m/det}^2$

$\alpha = \frac{a}{r} = \frac{5}{0,5} = 10 \frac{\text{rad}}{\text{det}^2}$

$\tau = 10 \cdot \times 0,5 = 5 \text{ N.m}$

$\alpha = \frac{\tau}{I} \Rightarrow 10 = \frac{5}{I}$

$I = \frac{5}{10} = 0,5 \text{ sm}$



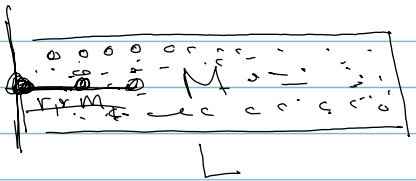
$a = \frac{F}{m}$

$\alpha = \frac{a}{r} = \frac{F}{m \cdot r}$

$\tau = F \cdot r$

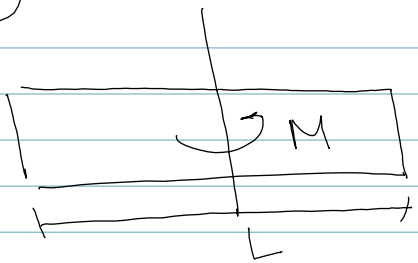
$\alpha = \frac{F \cdot r}{I}$

$\frac{F}{mr} = \frac{F \cdot r}{I} \Rightarrow \boxed{I = m \cdot r^2}$



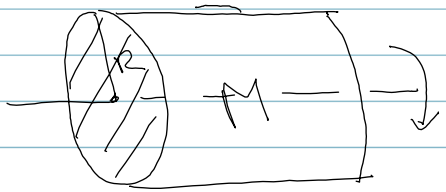
$\boxed{I = \frac{1}{3} M L^2}$

2

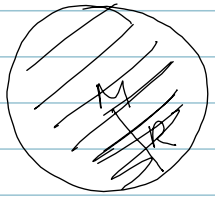


$$I = \frac{1}{12} M L^2$$

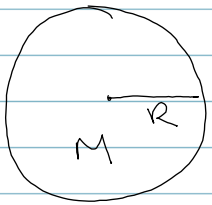
$$I = \frac{1}{2} M R^2$$



$$I = \frac{1}{2} M R^2$$



$$I = \frac{2}{5} M R^2$$

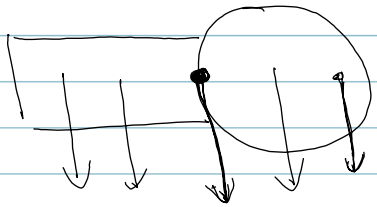


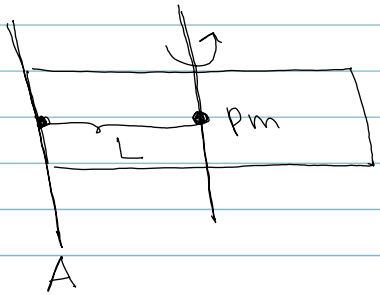
$$I = \frac{2}{3} M R^2$$

3

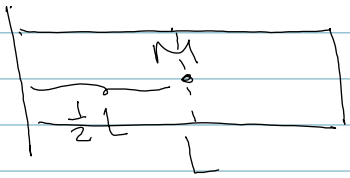
Teorema Sumbu Sejajar

pusat massa : titik dimana jika ada gaya yang bekerja padanya tidak akan menyebabkan benda berotasi





$$I_A = I_0 + m \cdot L^2$$



$$I_A = I_0 + M\left(\tfrac{1}{2}L\right)^2$$

$$= \frac{1}{12} ML^2 + \frac{1}{4} ML^2$$

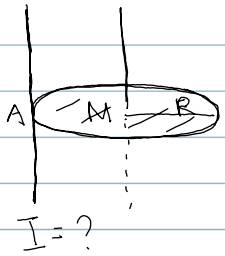
$$= \frac{4}{12} ML^2$$

$$= \frac{1}{3} ML^2$$

(4)

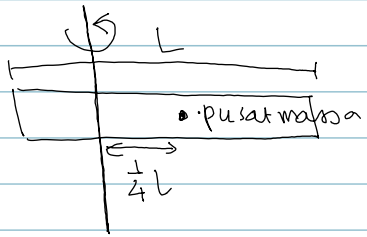
Latihan

1)



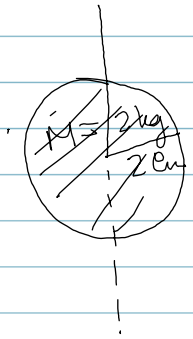
$I_0 = \frac{1}{2} m R^2$

2)



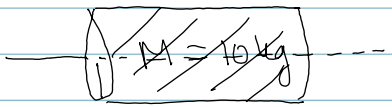
$I_0 = \frac{1}{12} M L^2$

3)



$I = ?$

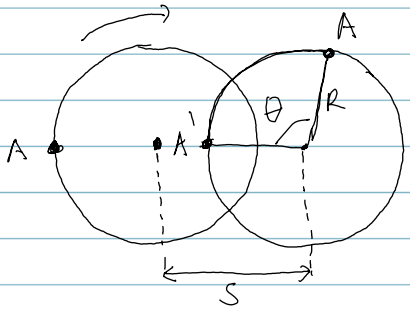
4)



$R = 10$ cm

$I = ?$

bergulir tanpa slip



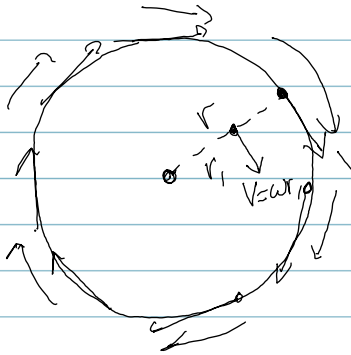
$S = \theta \cdot R$

$S > \theta R$ translasi > rotasi
$S < \theta R$ translasi < rotasi

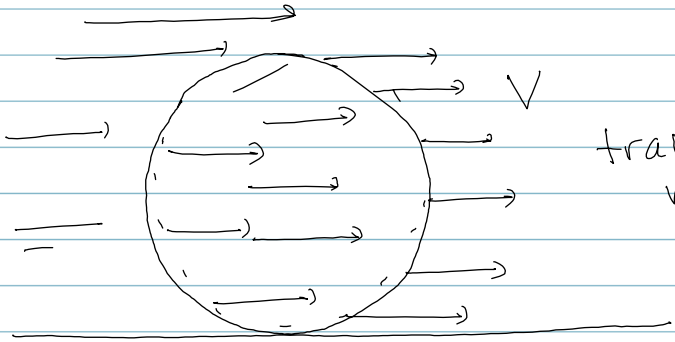
$S = \theta R$
$V = \omega R$ (bergulir tanpa slip)
$a = \alpha R$ (" " ")

a = percepatan pusat massa
V = kecepatan " "

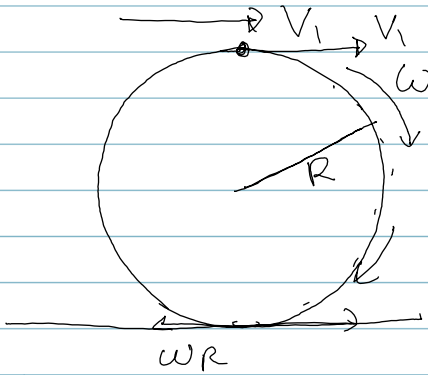
Percepatan & kecepatan sebuah titik

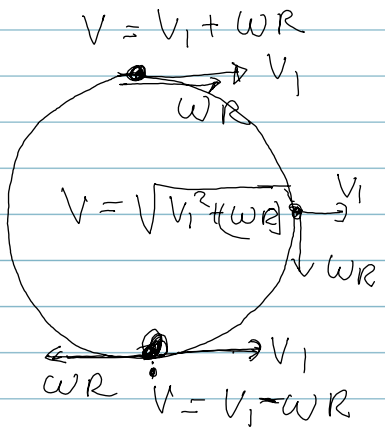


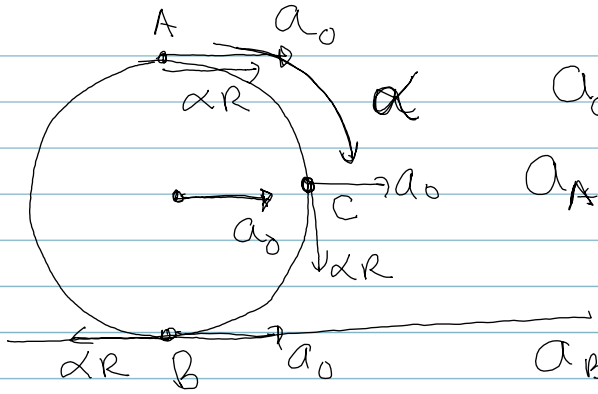
rotasi murni



translasi murni





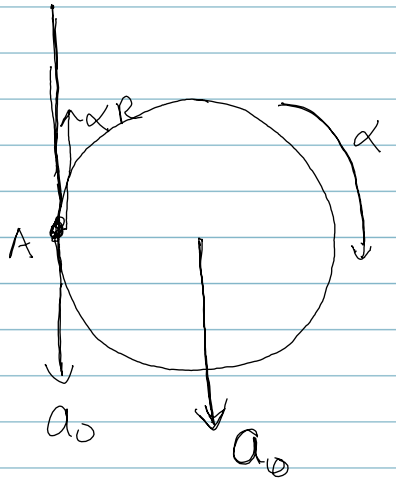


$a_0 = \alpha R$

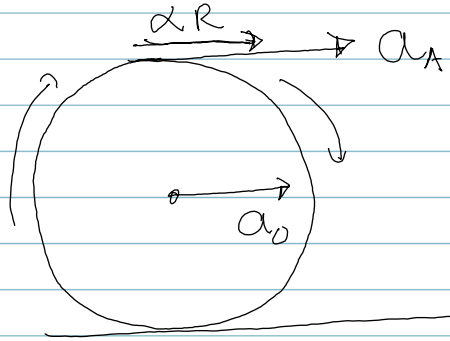
$a_A = a_0 + \alpha R$
$= 2\alpha R$

$a_B = a_0 - \alpha R$
$= 0$

$a_C = \sqrt{a_0^2 + (\alpha R)^2} = \alpha R\sqrt{2}$



$a_A = a_0 - \alpha R$
$= 0$



$a_0 = \alpha R$

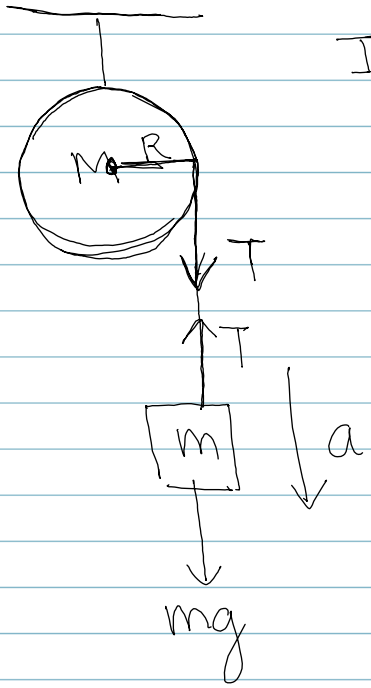
$a_A = \alpha R + a_0$

$a_A = 2a_0$

$a_0 = \frac{1}{2} a_A$

Katrol

1)



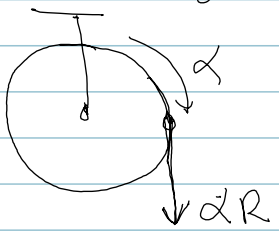
$$I = \frac{1}{2} M R^2$$

$$a = \frac{mg - T}{m}$$

$$\alpha = \frac{T \cdot R}{I}$$

$$= \frac{T \cdot R}{\frac{1}{2} M R^2}$$

$$\alpha = \frac{2T}{MR}$$



$$a = \alpha R$$

$$\frac{mg - T}{m} = \frac{2T}{MR} R$$

$$g - \frac{I}{m} = \frac{2T}{M}$$

$$g = T\left(\frac{2}{M} + \frac{1}{m}\right)$$

$$a = \frac{mg - \frac{g}{\left(\frac{2}{M} + \frac{1}{m}\right)}}{m}$$

2)

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

$a = \frac{mg - T}{m}$

$\alpha = \frac{T \cdot r}{I}$

$a = \alpha r$

$\frac{mg - T}{m} = \frac{Tr}{I} r$

$g - \frac{T}{m} = \frac{Tr^2}{I}$

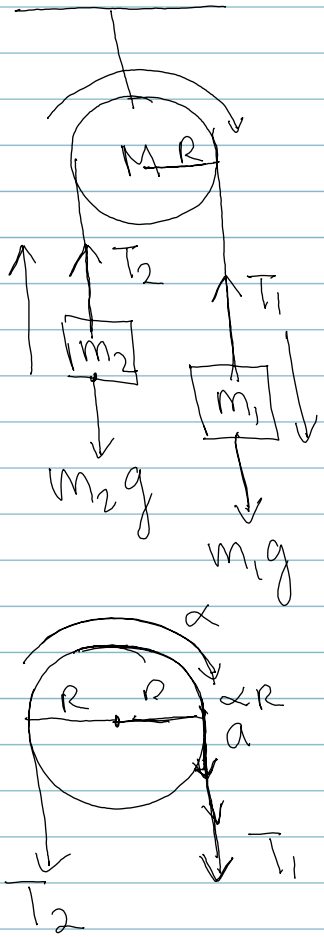
$g = T\left(\frac{r^2}{I} + \frac{1}{m}\right) \Rightarrow T = g \Big/ \left(\frac{r^2}{I} + \frac{1}{m}\right)$

$a = \frac{mg - T}{m} = g - \frac{T}{m} = g - \frac{g}{m\left(\frac{r^2}{I} + \frac{1}{m}\right)}$

$= g - \frac{g}{\left(\frac{r^2 m}{\frac{1}{2} m r^2} + \frac{m}{m}\right)} = g - \frac{g}{3}$

$= \frac{2}{3} g$

3)



$$I = \frac{1}{2} M R^2$$

$$a = \frac{m_1 g - T_1}{m_1}$$

$$-T_1 = m_1 a - m_1 g$$

$$T_1 = m_1 g - m_1 a$$

$$a = \frac{T_2 - m_2 g}{m_2}$$

$$T_2 = m_2 a + m_2 g$$

$$\alpha = \frac{T_1 R - T_2 R}{I}$$

$$a = \alpha R$$

$$\frac{a}{R} = \frac{(m_1 g - m_1 a) R - (m_2 a + m_2 g) R}{\frac{1}{2} M R^2}$$

$$a = \frac{(m_1 - m_2) g - (m_1 + m_2) a}{\frac{1}{2} M}$$

$$a = \frac{(m_1 - m_2) g}{m_1 + m_2 + \frac{1}{2} M}$$