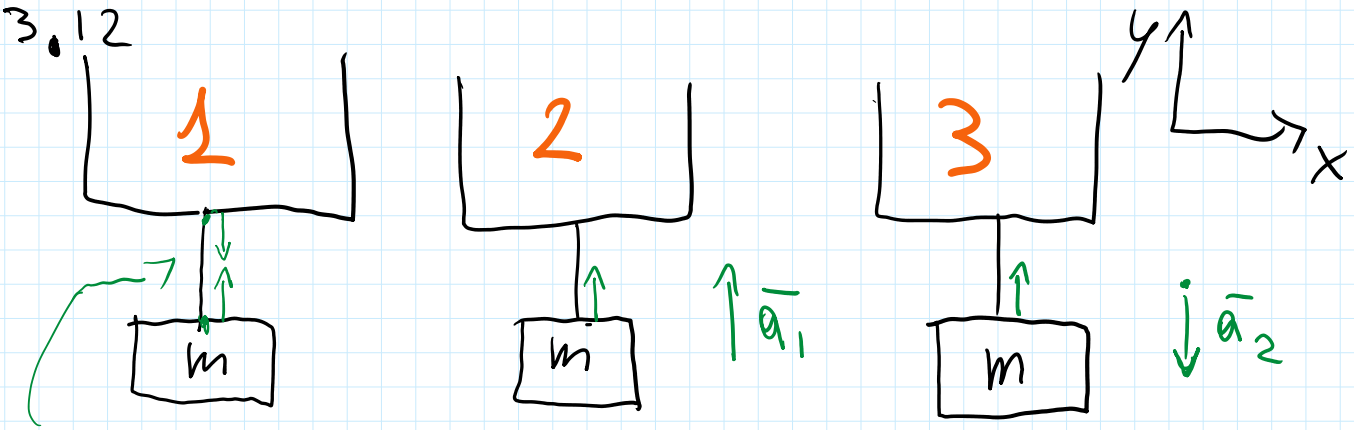
Tutorato 2

giovedì 9 marzo 2023 12:33

3.12



$T_1 = 31\,N$ $T_2 = 40\,N$ $T_3 = 26\,N$

1) $\bar{F} = m\bar{a} \rightsquigarrow \bar{F} = m \cdot \bar{g}$

$31 = m \cdot 9{,}81$

$\rightsquigarrow m = 3{,}16\,kg$

2) $T_2 = 40\,N \quad (> T_1 = 31\,N)$

$F = m \cdot a$ ($N + P$)

$T_2 - mg = ma_1 \rightsquigarrow 40 - 3{,}16 \cdot 9{,}81 = ma_1$

ΣF

$\rightsquigarrow a_1 = \dfrac{40 - 31}{3{,}16} = 2{,}84\,m/s^2$

$\bar{a}$ direzione y e verso positivo

($T_2 > T_1$)

3) $T_3 < T_1$

$\rightsquigarrow T_3 - mg = ma_2$

$26 - 31 = ma_2 \rightsquigarrow a_2 = \dfrac{-5}{\quad} = -1.58\,m/s^2$

$$26 - 31 = m a_2 \rightsquigarrow a_2 = \frac{-5}{3,16} = -1,58\ m/s^2$$

$\bar{a}$ dir. y e verso il basso

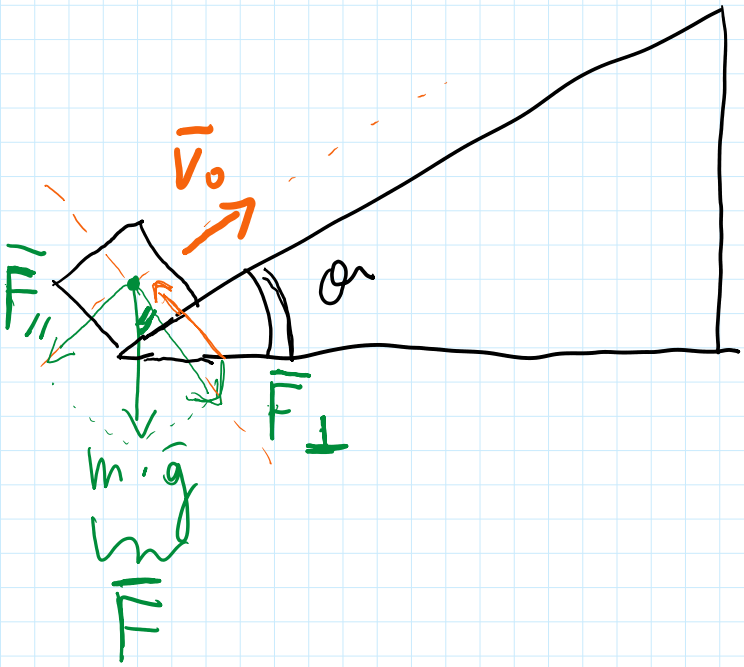
$$\downarrow$$

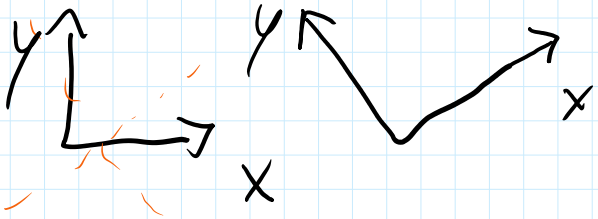
$$(T_3 < T_1)$$

3.35

$V_0 = 10\ m/s$

$\theta = 36°$





$$\bar{F} = m \cdot \bar{a}$$

$$F_{//} = F \cdot \sin\alpha = m \cdot g \cdot \sin\theta = m \cdot 9,81 \cdot 0,59 = 5,77 \cdot m \quad N$$

$$F_{//} = m \cdot a_{//} \rightsquigarrow a_{//} = \frac{F_{//}}{m} = 5,77\ m/s^2$$

$$\bar{x}(t) = x_0 + \bar{V}_0 t + \frac{1}{2} \bar{a} t^2$$

$$\begin{cases} x(t) = x_0 + v_0 t + \frac{1}{2} a t^2 \\ v(t) = v_0 + a t \end{cases}$$

((N.B moto decelerato $\rightsquigarrow a = -a_{//}$ per come si è considerato il verso di $F_{//}$))

$$v_1 = v_0 + a t$$

(si ferma) $\downarrow$ $\quad a = -5{,}77\ m/s^2$ $\uparrow$

$$0 = 10 - 5{,}77 \cdot t$$

$$\rightsquigarrow t = 1{,}73\ s \Rightarrow \text{TEMPO}$$

$$x = x_0 + v_0 t + \frac{1}{2} a t^2$$

$$x = 0 + 10 \cdot 1{,}73 - \frac{1}{2} \cdot 5{,}77 \cdot (1{,}73)^2$$

$$\rightsquigarrow x = 8{,}67\ m \quad \text{DISTANZA}$$

$x(t) = \ldots$

$v(t) = \ldots$

$$v_2 = v_1 + a t \qquad v_2 = 0 - 5{,}77 \cdot t$$

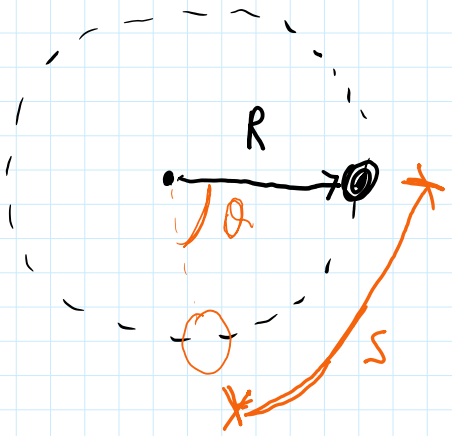
$$x = x_0 + v_0 t + \frac{1}{2} a t^2$$

$$0 = 8,67 + 0 - \frac{1}{2} 5,77 \cdot t^2$$

$$t = \sqrt{\frac{8,67}{\frac{1}{2} \cdot 5,77}} = 1,73\ s$$

$$8,67 = 0 + 0 + \frac{1}{2} \cdot 5,77 \cdot t^2$$

2.19



$R = 0,6\ m$

$V = \frac{1}{(At + B)}\ m/s$

$A = 5\ (m^{-1})$

$B = 1\ (m^{-1}/s^{-1})$

$V = \frac{1}{(5t + 1)}$

← (MOTO ACCELERATO NON UNIFORME)

$\theta = ?$ $\quad \theta_0 = 0$

$$\left[s = \int_{t_0}^{t_1} \frac{1}{5t+1}\, dt \right]$$

$$s = \int \frac{1}{5t+1}\, dt$$

$\left(\bar{v} = \frac{d\bar{s}}{dt} \right)$

$\left(\rightsquigarrow d\bar{s} = \bar{v}\, dt \right)$

$\left(s = \int \bar{v}\, dt \right)$

(M. circolare $\rightsquigarrow s = R \cdot \theta$)

$| \; 5t+1$

$(\rightsquigarrow \; s = R \cdot \theta \;)$

$s(t) = \frac{1}{5} \ln(5t+1) + c_1 \qquad t=0 \qquad s=0$

$s(t) = \frac{1}{5} \ln(5t+1) \qquad \rightsquigarrow c_1 = 0$

$s(t) = R \cdot \theta(t) \qquad \theta(t) = \frac{1}{5R} \ln(5t+1)$

$t = 2\,s \rightsquigarrow \theta_1 = ?$

$\theta_1 = \frac{1}{(5 \cdot 0{,}6)} \ln(5 \cdot 2 + 1) = 0{,}8\,rad$

$\omega(t) = ? \qquad v(t) = \omega(t) \cdot R$

$\rightsquigarrow \omega(t) = \frac{1}{(5t+1) \cdot R} \quad \frac{rad}{s}$

$\bar{a}_{TOT} = ? \qquad \bar{a}_N = \omega^2 R$ (acc. centripeta) $\qquad a_T = \alpha \cdot R$ (acc. tangenziale)

$\bar{a}_{TOT} = \sqrt{a_n^2 + a_T^2} \quad m/s^2$

$\left(\bar{\alpha} = \frac{d\bar{\omega}}{dt} \right)$ ($\bar{\alpha}$: acc. angolare)