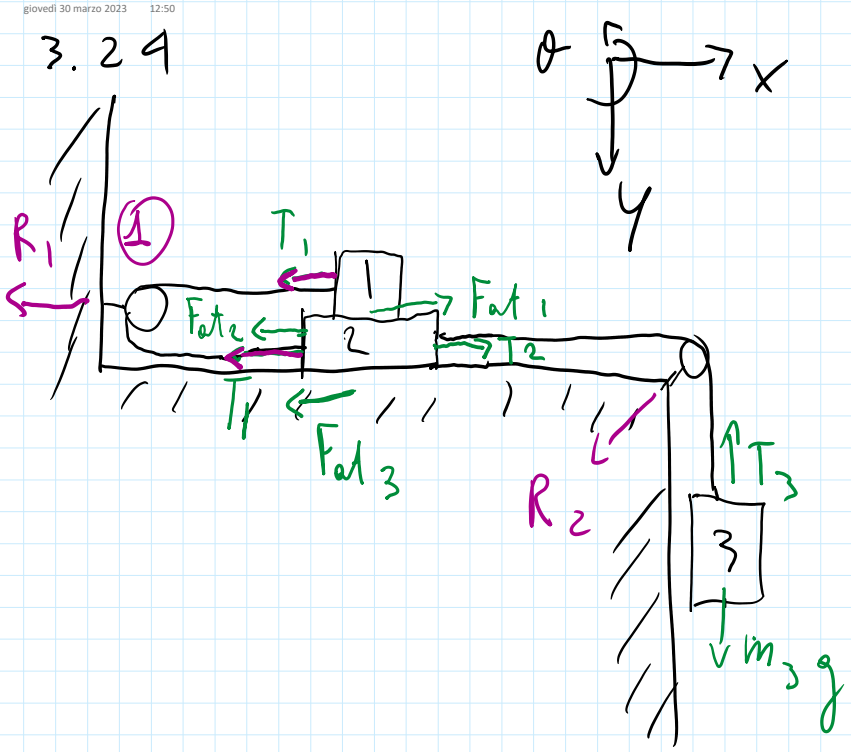
Tutorato 05

giovedì 30 marzo 2023 12:50

3.24



$m_1 = 1\ kg$

$m_2 = 2,5\ kg$

$m_3 = 5\ kg$

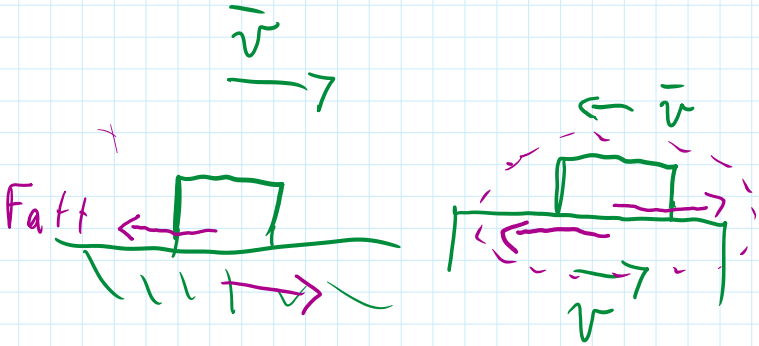
$\mu_d = 0,3$

$a = ?$ $T_1 = ?$ $T_2 = ?$

$\sum F = m \cdot a$

Corpo 3

$m_3 \cdot g - T_2 = m_3 \cdot a$



Corpo 2

$T_2 - \mu g (m_1 + m_2) - \mu g (m_1) - T_1 = m_2 \cdot a$

Corpo 1

va a sinistra

$-T_1 + \mu g (m_1) = (-) m_1 \cdot a$

Sistema 3 eq 3 incognite

$$\begin{cases} m_3 \cdot g - T_2 = m_3 a \\ T_2 - \mu g (m_1 + m_2) - \mu g (m_1) - T_1 = m_2 a \end{cases}$$

$$\begin{cases} T_2 - \mu g (m_1 + m_2) - \mu g (m_1) - T_1 = m_2 a \\ -T_1 + \mu g (m_1) = -m_1 \cdot a \end{cases}$$

$$\begin{cases} 49,05 - T_2 = 5a \\ T_2 - 10,3 - 3,9 \cdot T_1 = 2,5a \\ -T_1 + 3,9 = -a \rightsquigarrow a = T_1 - 3,9 \end{cases}$$

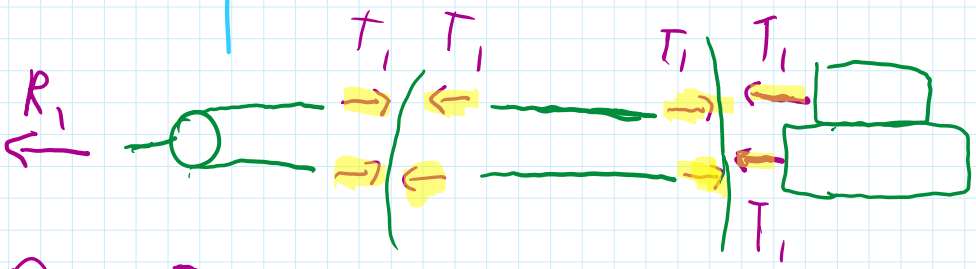
CONTI

$a = 3,86 \ m/s^2 \qquad T_1 = 6,8 \ N \qquad T_2 = 29,7 \ N$

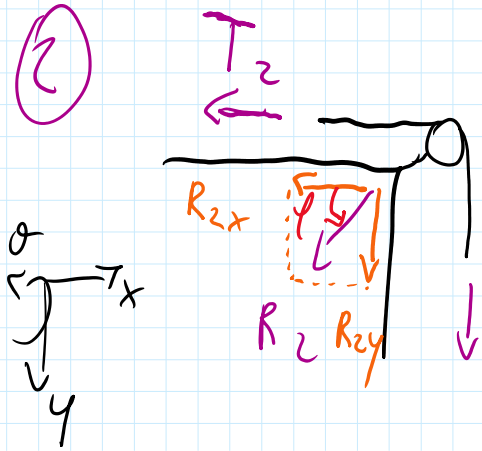
(1)

$R_1 = T_1 + T_2$

$= 13,6 \ N$



(2)



$(-T_2 \cdot \bar{u}_x + T_2 \cdot \bar{u}_y = \bar{R}_2)$

x) $-T_2 - R_{2x} = 0$

y) $R_{2y} + T_2 = 0$

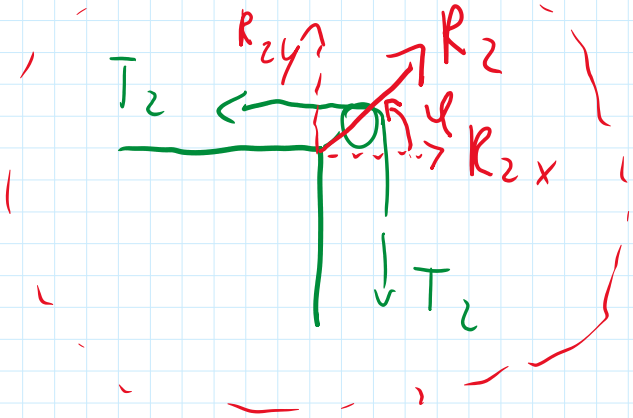
v_y ... $y)\ R_{2y} + T_2 = 0$

$x)\ R_{2x} = -T_2 = -29,7\ N$

↳ verso opposto a quello disegnato

$y)\ R_{2y} = -T_2 = -29,7\ N$

↳ No che la forza è contraria al SIST. DI RIFERIMENTO



↳ SOLUZIONE

Ma angolo $\varphi = ?$

$$\varphi = \text{atan}\left(\frac{R_{2y}}{R_{2x}}\right) = 45°$$

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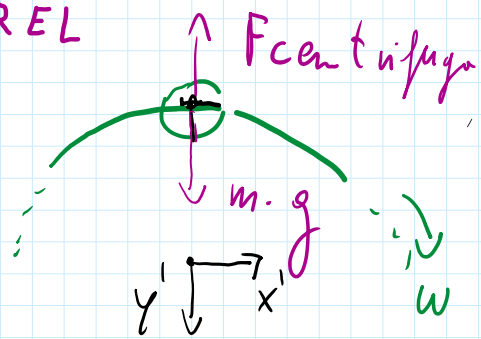
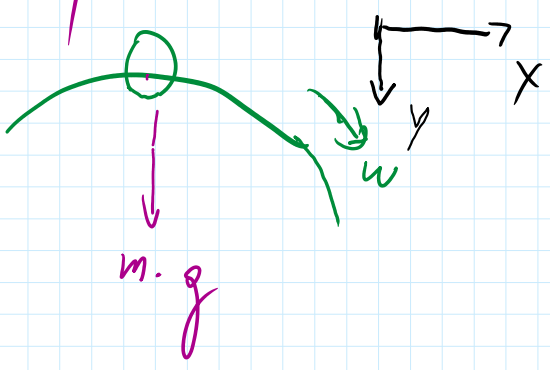
1) REL



2) ASS



La pallina è ferma per il SIST. RELATIVO solidale alla rotazione

$\Sigma F = m \cdot a_{TOT}$

per il SIST. RELATIVO solidale alla rotazione

$\sum F = m \cdot a_{TOT}$

$m \cdot g = m \omega^2 R$

$a_{TOT} = a_{REL} + a_{OO'} + 2\omega \times v' + \omega \times (\omega \times r)$

a_{REL}: acc. relativa

$a_{OO'}$: acc. LINEARE CENTRO

$2\omega \times v'$: CORIOLIS

$\omega \times (\omega \times r)$: CENTRIFUGA

$a_{OO'} + \omega \times (\omega \times r)$: TRASCINAMENTO

$a_{OO'}$ lin. → LIN.

$\omega \times (\omega \times r) \rightsquigarrow \omega^2 r$ come centripeta

$a_{TOT} = \omega^2 r$ (come si era trovato nel SIST. ASSOLUTO)

$+ m \cdot g - m \omega^2 r = 0$

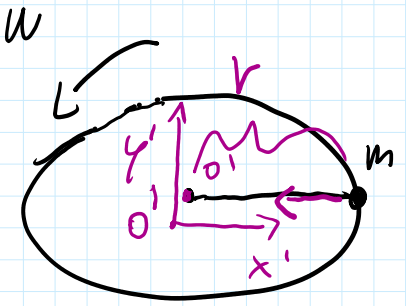
$m \cdot g = m \omega^2 r$

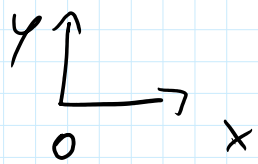
$\sum F = m a_{REL}$, $a_{REL} = 0$

$F_{PESO} + F_{CENTRIFUGA} = 0$

a_{TOT}: TOTALE, VISTO DAL SIST. ASSOLUTO

$a_{REL} + a_{OO'} + 2\omega \times v' + \omega \times (\omega \times r)$: TOTALE, SENTITO DAL SIST. RELATIVO MOBILE





PIANO ORIZZONTALE

ASSOLUTO

$T = m \cdot a_{ASS} \rightsquigarrow T = m \cdot \omega^2 r$

IN DIREZIONE RADIALE

$(\Sigma F = m \cdot a_{ASS})$

RELATIVO

vede la pallina ferma

$\rightsquigarrow a' = 0$

$\rightsquigarrow v' = 0$

velocità RELATIVA $= 0$

NO CORIOLIS

MA $\omega \neq 0$ ← (ROTAZIONE DEL SISTEMA)

↳ FORZA CENTRIFUGA

FORZE APPARENTI:

I $F_{\text{TRASCINAMENTO LINEARE}} = m \cdot a_{OO'} = 0$

II $F_{CORIOLIS} = -2m \cdot \omega \times v' = 0$

III $F_{CENTRIFUGA} = m \cdot \omega \times (\omega \times r) = -m\omega^2 r \neq 0$

(TRASCINAMENTO ROTATORIO)

$F_{TRASCINAMENTO} = F_{TRASC. LIN} + F_{TRASC ROT}$

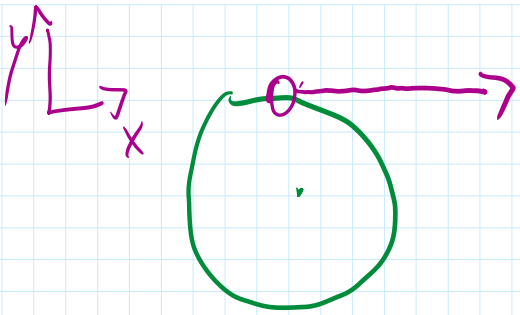
$\Sigma F = m \cdot a_{REL} \rightsquigarrow \Sigma F = 0$ ($a_{REL} = 0$)

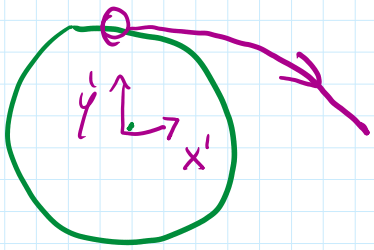
$T + F_{TRASC. LIN} + F_{CORIOLIS} + F_{CENTRIFUGA} = 0$

$T - m\omega^2 r = 0$

$T = m\omega^2 r$

come ricavato nel SIST. FISSO ASSOLUTO


y'
x
O'


O'
y'
x'