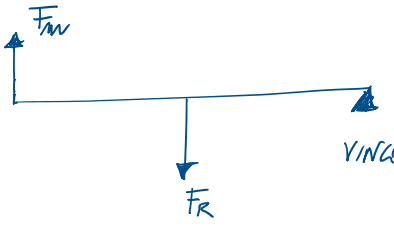
Lezione #7
4/12/2025

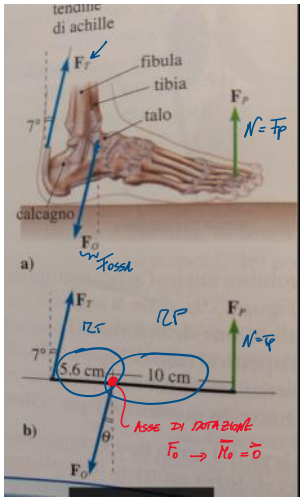
LEVA 2° GENERE

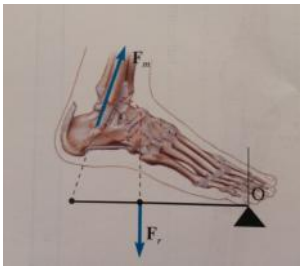


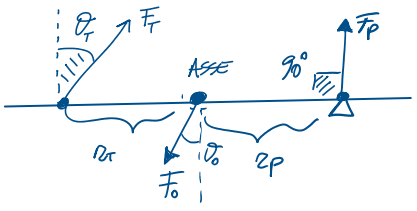
Da un pto di vista $\vec{F}_R$:

$$F_y^{RIS} = 0 = -F_P + N = 0$$

$$\boxed{N = F_P}$$







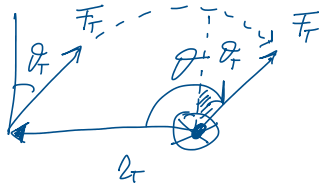
F_T = forza Tendine di Achille ?
F_O = ~~forza~~ esercitata dalla osca
F_P = forza peso = 900 N
r_T = 5,6 cm
r_P = 10 cm
θ_T = 7°

Calcolare F_T ?

Se scegliamo asse di rotazione nel pto F_0

$M_T = ?$

$M_P = ?$

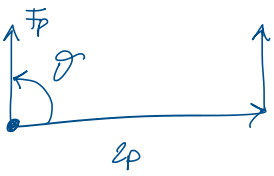


$\vartheta = 90° + \vartheta_T = 97°$

r_T ruota F_T senso orario $\Rightarrow M_T < 0$ ⊗

$M_T = - r_T F_T \sin(97°)$

$M_P = ?$



$\vartheta' = 90°$

r_P ↺ F_P senso antiorario

$M > 0$

$M_P = r_P F_P \underbrace{\sin 90°}_{1} = r_P F_P$

$M^{RIS} = M_T + M_P = 0$

$- r_T F_T \sin 97° + r_P F_P = 0$

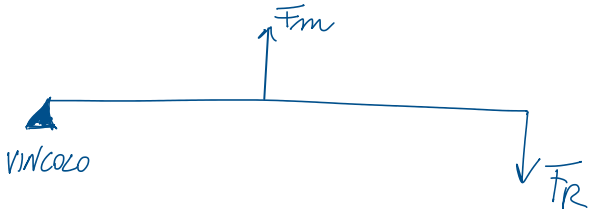
↑ ↓ incognita ↑ ↑

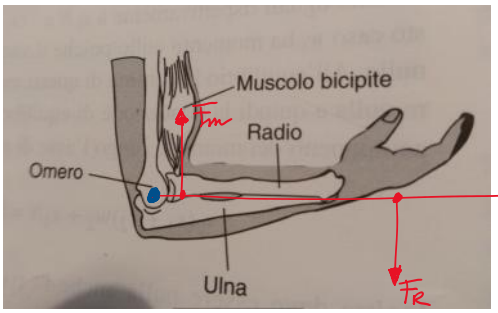
$F_T = \dfrac{r_P F_P}{r_T \sin 97°} = 1{,}8\, F_P$ (1,8)

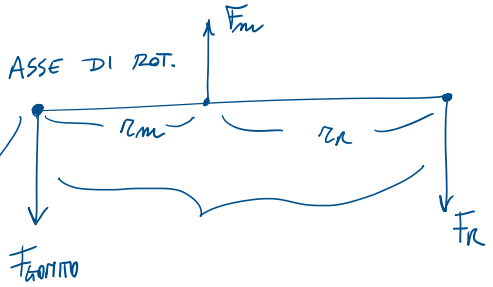
$F_T = 2 F_P$

$F = 1800\ N$

LEVA DI 3° TIPO:







$\begin{cases} r_m = 0{,}05\ m \\ r_R = 0{,}15\ m \\ F_R = 12\ N \end{cases}$

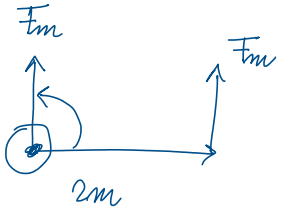
$F_m = ?$

$F_{GIUNTO} = ?$

→ Con questa scelta $M_{GIUNTO} = 0$

$$\vec{M}_m + \vec{M}_R = \vec{0}$$

M_m :



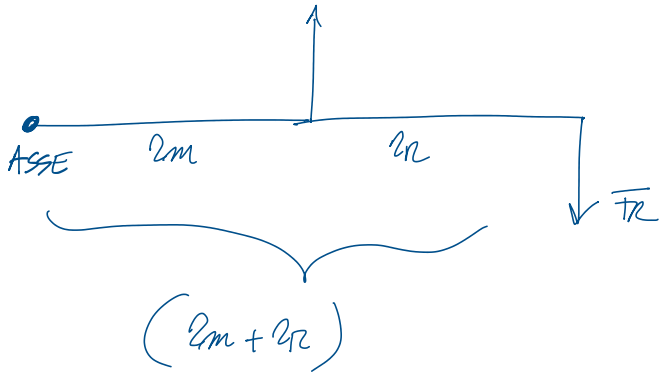
$\vartheta = 90°$

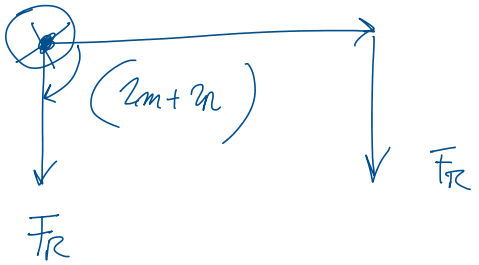
$2m$ e F_m senso antiorario

$M_m > 0$ ⊙

$M_m = 2m\, F_m \underbrace{\sin\varphi}_{1} = 2m\, F_m$

M_R :





2 ⟳ F_R senso orario

$\varphi = 90°$

$M_R < 0$

⊗

$M_R = -(2m + 2R)\, F_R \underbrace{\sin\varphi}_{1}$

$M_m + M_R = 0 \qquad 2m F_m - (2m + 2R) F_R = 0$

$$F_m = \frac{(2m + 2R)}{2m} F_R$$

$F_m = \left(\frac{20\ 10^{-2}}{5\ 10^{-2}}\right) F_R = 4 F_R$

La forza applicata ai

$F_m = 4 F_R$

la forza applicata ai muscoli bicipiti è 4 volte il peso da sostenere

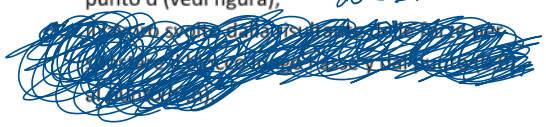
$F_m = 48\ N$

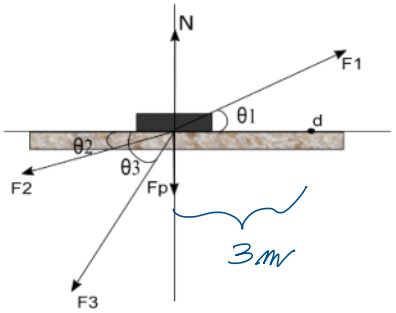
ESERCITAZIONE I° PARZIALE:

Esercizio 1 (13 pti)

Un blocco di massa m = 5,89 kg, visto trasversalmente, è sottoposto alla sua forza peso (Fp), alla forza normale della superficie (N) e a tre forze F_1 , F_2 e F_3 che lo spingono su un piano orizzontale (impenetrabile) privo di attrito. Sapendo che $F_1 = 11$ N, $\theta_1 = 21°$, $F_2 = 3$ N $\theta_2 = 36°$, $F_3 = 12$ N $\theta_3 = 66°$ calcolare:

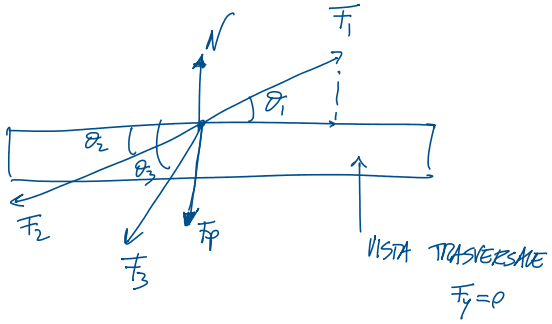
1. Modulo, direzione e verso della risultante delle forze e accelerazione del blocco;
2. Il momento della forza F_1 rispetto ad un asse perpendicolare al piano e passante per il punto d (vedi figura); $d = 3\,m$





3. Calcolare la F attrito nel caso in cui sul piano si abbia $\mu_D = 0{,}04$

1)



$$\begin{cases} F_x = F_1\cos\vartheta_1 - F_2\cos\vartheta_2 - F_3\cos\vartheta_3 \\ F_y = N - F_p + F_1\sin\vartheta_1 - F_2\sin\vartheta_2 - F_3\sin\vartheta_3 = 0 \\ F_y = 0 \end{cases}$$

$$\begin{cases} F_x = 2{,}97\,N \\ F_y = 0 \end{cases}$$

$$|\vec{F}^{RIS}| = \sqrt{F_x^2 + F_y^2} = 2{,}97\,N$$

$F_y = 0$

$$\boxed{F^{RIS} \simeq 3\,N \quad (1\ c.s.)}$$

2) II^a LEGGE DI NEWTON $\quad F = ma$

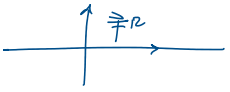
$$a = \frac{F}{m}$$

$$a = \frac{2{,}97}{5{,}89} = 0{,}50\ m/s^2$$

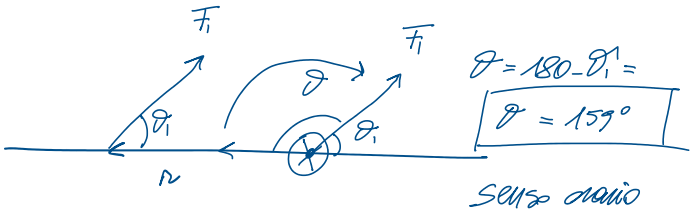
$$\boxed{a \simeq 0{,}5\ m/s^2 \quad (1\ c.s.)}$$

Direzione e verso:

$$\vartheta = \arctg\left(\frac{F_y}{F_x}\right) = 0$$



2)



$\vartheta = 180 - \vartheta_1 =$

$\boxed{\vartheta = 159°}$

Senso orario

$M_1 < 0$ ⊗

$$M_1 = -2F_1\sin(159°) = -11{,}83\,Nm$$

$$\boxed{M_1 \simeq -10\,Nm \quad (1\ c.s.)}$$

3) $F_D = -\mu_D N \qquad N = ?$

$$F_y = N - F_p + F_1\sin\vartheta_1 - F_2\sin\vartheta_2 - F_3\sin\vartheta_3 = 0$$

$$N = F_p - F_1 \sin\vartheta_1 + F_2 \sin\vartheta_2 + F_3 \sin\vartheta_3$$

$$N = 66{,}52\,N$$

$$F_D = -0{,}04 \cdot 66{,}52 = -2{,}6608\,N$$

$$F_D \underline{\underline{n}} - 3\,N \quad (1\,c.s.)$$