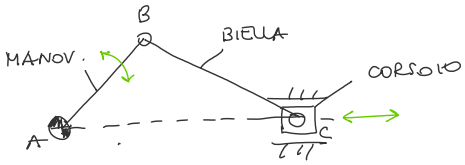
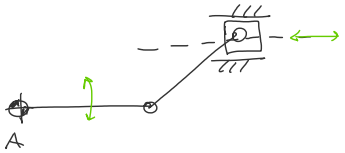
Esercizio: protesi di ginocchio

venerdì 15 novembre 2024 11:33

MANOVELLISMO DI SPINTA



MDS CONCEN.



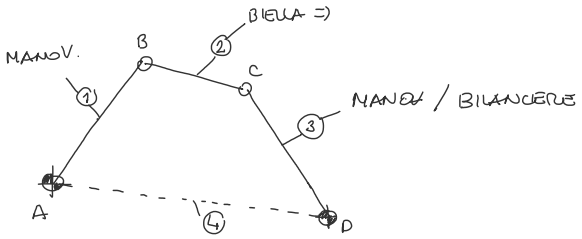
MCS ECCENTRICO

MANOVELLA : MOTO ROTAT. CONTINUO

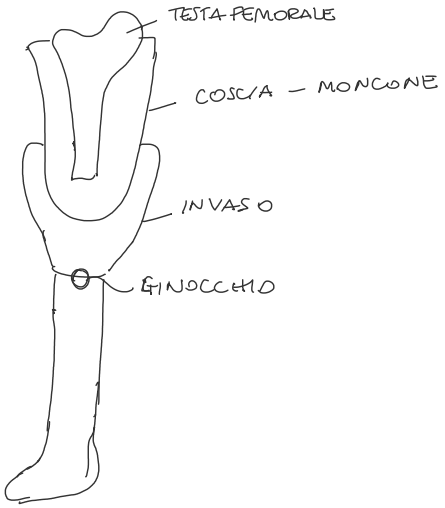
BIELLA : MOTO ROTOTRASLATORIO

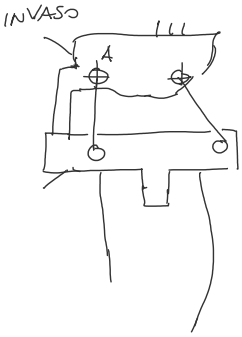
BILANCIERE : MOTO ROT. ALTERNO

QUADRILATERO ARTICOLATO

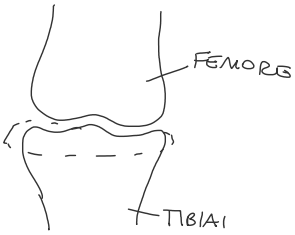


PROTESI TRANSFEMORALI DI GINOCCHIO

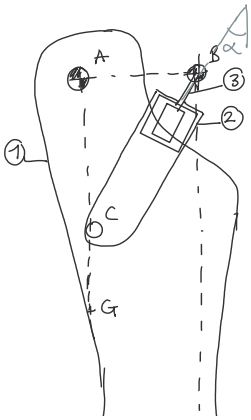




PIATTO TIBIALE



PROTESI ATTIVA – OTTOBOCK – C LEG



Noto: massa ① = m = 3,5 kg

②+③ ATTUATORE IDRAULICO

A, C e G sono allineati ⊛

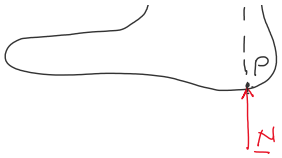
Ep. statico affidato all'attuatore

$\overline{AB}$ = 25 mm $\overline{AC}$ = 120 mm

Richiesto:

1) FASE DI VOLO – ⊛ ⇒ mg

⇒ F_{att}, R_A



2) FASE DI APPOGGIO : $|\underline{N}| = 700N$

$(P, \underline{N})$

$\Rightarrow$ PSE $<$ $\underline{mg}$, $\underline{N}$

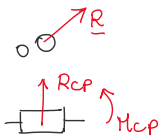
$\Rightarrow$ DCL DEFINITI

3) Ridurre $\underline{mg} \oplus \underline{N}$ al SEM

4) Cosa succede in un istante diverso dalla fase di volo

•) AGV: $n_{gdl} = 3 \times 3 - \underbrace{3 \times 2}_{\text{CERN.}} - \underbrace{1 \times 2}_{\text{COP. PRI}} = 1\ gdl$ $\Rightarrow$ FLESSO-ESTENSIONE

•) AFV: $O, A, B, C \Rightarrow 2\,INC. \times 3 = 6\,INC.$



$(O, \underline{R}) \Rightarrow R_x, R_y \Rightarrow 6\,INC.$

$\Rightarrow R_{CP}, M_{CP} \Rightarrow 2\,INC$

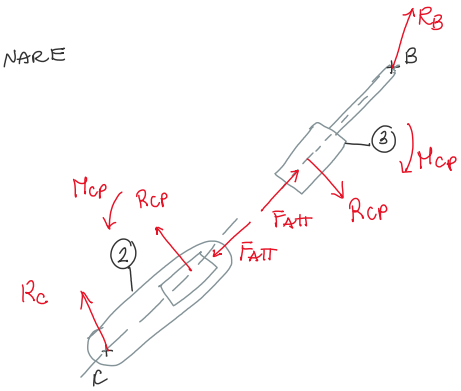
8 INC. REATTIVE + 1 INC. ATTIVA } 9 INC. VS 9 EQ^{NI} (3 CORPI x 3 EQ)

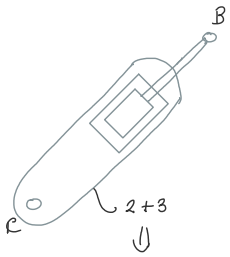
$\Rightarrow$ SCI

AZIONE ATTIVA INCOG. $\Rightarrow F_{ATT}$.

•) ~~3~~ CORPI SCARICHI

DCL PRELIMINARE





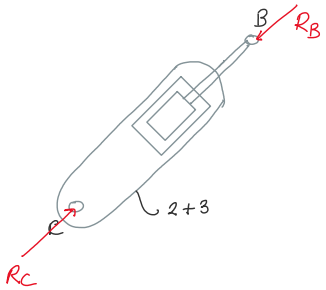
1) NON VEDO $\underline{F_{ATT}}$

↳ AZIONE ATTIVA ESTERNA

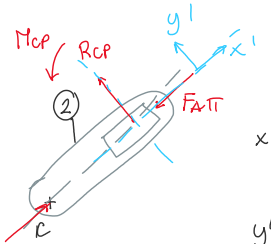
2) 2+3 COSTITUISCONO CORPO SCARICO!

$\Downarrow$

SOTTOSISTEMA SCARICO!



$\underline{R_C} = -\underline{R_B}$



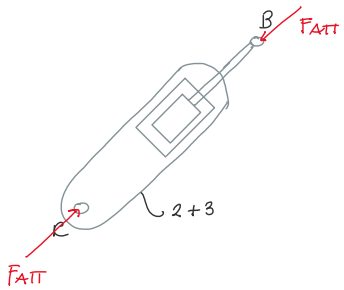
x') $-F_{ATT} + R_C = 0$

$F_{ATT} = R_C$

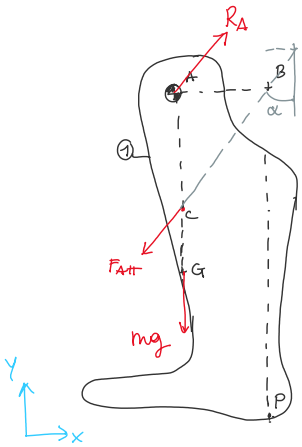
y') $R_{CP} = 0$

R_C

$M_{CP} = 0$



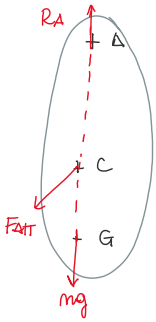
CASO mg



3 INCOGNITE: R_{Ax}, R_{Ay}, F_{ATT} + 3 EQ NI

⇓

3 FORZE ✳ C

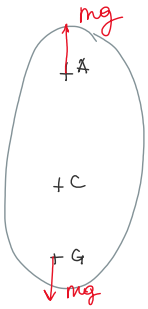


$R_A \parallel mg$

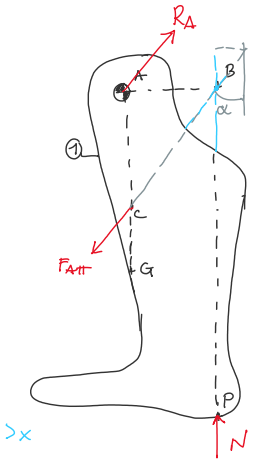
ICD · x: $F_{ATT} \cos\alpha = 0$

$F_{ATT} = 0$ N

y: $R_{Ay} = mg = R_A = 34,3$ N



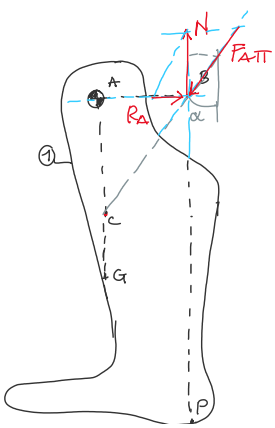
CASO N



3 INC.: R_{Ax}, R_{Ay}, F_{ATT} ⟷ 3 EQ NI

3 FORZE ✳ B

$\alpha = \operatorname{atan}\left(\frac{\overline{AC}}{\overline{AB}}\right) = 78,2°$



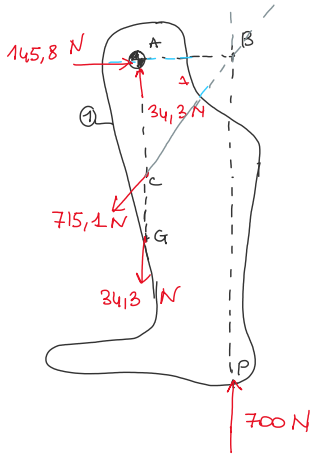
x: $R_A - F_{ATT} \sin\alpha = 0$

y: $N - F_{ATT} \cos\alpha = 0$

$F_{ATT} = \frac{N}{\cos\alpha} = 715,1$ N

$R_A = N \operatorname{tg}\alpha = 148,5$ N

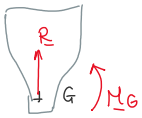
DCL DEF : SOMMO $\underline{mg} \oplus \underline{N}$



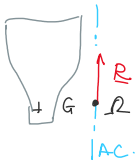
3) SEM $\Rightarrow$ $(G, m\underline{g}), (P, \underline{N})$

$\alpha = 0 \Rightarrow$ POLO RIDUZIONE "G" $\Rightarrow$ $\underline{R} = -mg\,\underline{j} + N\,\underline{j} = 665{,}7\,\underline{j}$ N

$\underline{M}_G = N\,\overline{AB}\,\underline{k} = 17{,}5$ Nm $\underline{k}$



$\Rightarrow$ SEM ?

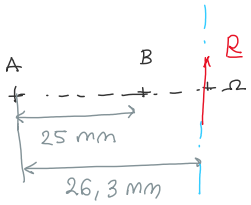


I MET) $\underline{M}_\Omega = \underline{0} = \underline{M}_G + \overrightarrow{\Omega G} \wedge \underline{R}$

$\overrightarrow{G\Omega} \wedge \underline{R} = \underline{M}_G$

$$\begin{vmatrix} \underline{i} & \underline{j} & \underline{k} \\ G\Omega_x & G\Omega_y & 0 \\ 0 & 665{,}7 & 0 \end{vmatrix} = 17{,}5\ \underline{k}$$

$G\Omega_x = 26{,}3$ mm



II MET) $\overrightarrow{G\Omega} = \dfrac{\underline{R} \wedge \underline{M}_G}{|\underline{R}|^2}$

5)