

CONDIZIONI DI EQUILIBRIO

$\vec{F} = - \frac{dU}{dx}$ $\frac{dU}{dx} = 0 \Rightarrow \vec{F} = 0$ (11)

e) Indifferenti

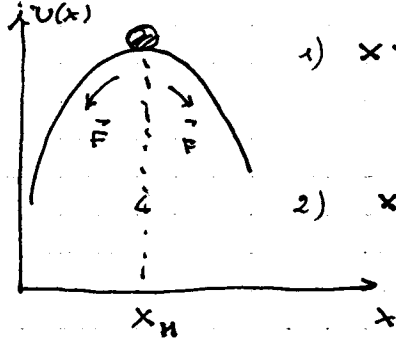
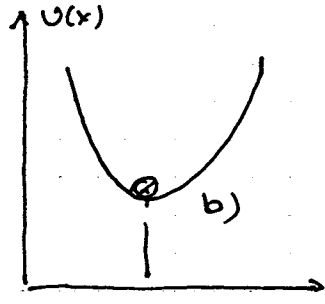
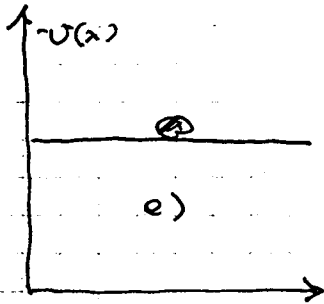
$U(x_e) = \bar{U}_m$

b) Stabile

$U = \text{cost.}$

c) Instabile

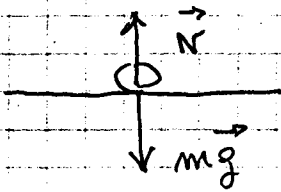
$U(x_e) = \bar{U}_M$



- 1) $x > x_M$ $\frac{dU}{dx} < 0$,
 $\vec{F} > 0$
- 2) $x < x_M$ $\frac{dU}{dx} > 0$,
 $\vec{F} < 0$

STATO LEGATO

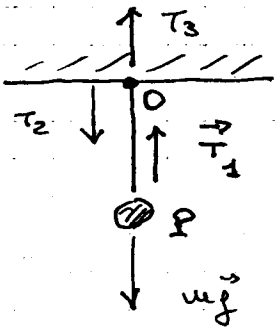
REAZIONI VINCOLARI



$\vec{N} + \vec{P} = 0$

CORPO IN QUIETE

TAVOLO



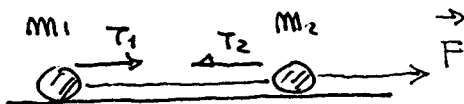
$\vec{T} + \vec{P} = 0$

$\begin{cases} \omega = 0 & \vec{T}_3 + \vec{T}_2 = 0 \\ \omega = P & \vec{P} + \vec{T}_1 = 0 \end{cases}$

$\vec{T}_1 = \vec{w}_g$

$\vec{T}_1 + \vec{T}_2 = 0$

PUNTO APPESO IN QUIETE



$\begin{cases} \vec{F} - \vec{T}_2 = m_2 \vec{a}_2 \\ \vec{T}_1 = m_1 \vec{a}_1 \end{cases}$

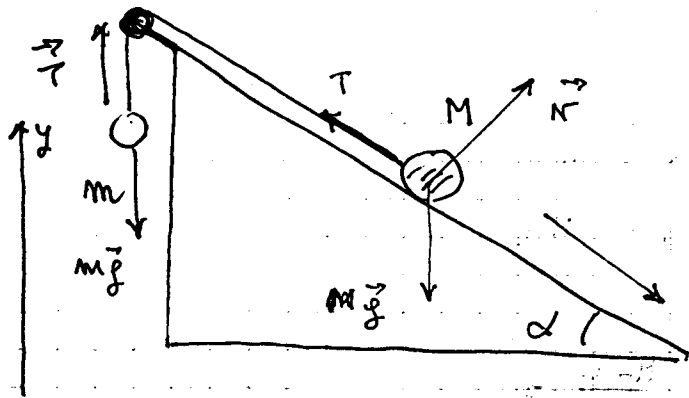
$\vec{a}_1 = \vec{a}_2$

CORPI COLLEGATI IN MOVIMENTO

$T_1 = T_2 = T$

$T = \frac{m_1}{m_1 + m_2} F$

$T_1 < F$



NOTO SU PIANO INCLINATO

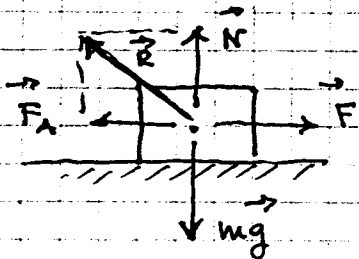
$$\begin{cases} M\vec{g} + \vec{N} + \vec{T} = M\vec{a} \\ m\vec{g} - \vec{T} = m\vec{a} \end{cases}$$

⇓

$$\begin{cases} Mg \sin \alpha - T = M a \\ Mg \cos \alpha = N \\ -mg + T = m a \end{cases}$$

$$a = \frac{Mg \sin \alpha - mg}{m + M} ; T = \frac{mMg(1 + \sin \alpha)}{m + M}$$

FORZE DI ATRITO

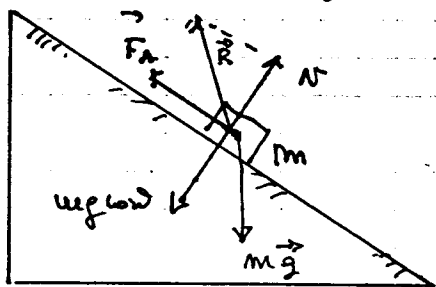


$F_A \leq \mu_s N$ (Forza di attrito statico)

$\vec{R} = \vec{N} + \vec{F}_A$ (Reazione vincolare)

$\mu_d N = F_{Ad} \leq F_A \leq \mu_s N$ (Forza attrito dinamico)

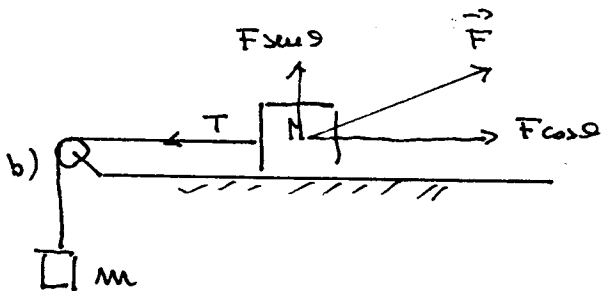
a)



$$\begin{cases} mg \sin \theta - F_A = 0 \\ N - mg \cos \theta = 0 \end{cases}$$

$F_A = \mu_s N = \mu_s mg \cos \theta$

b)



$$\begin{cases} F \cos \theta - T - F_A = M a \\ N + F \sin \theta - Mg = 0 \end{cases}$$

$-mg + T = m a$

$F_A = \mu N = \mu (Mg - F \sin \theta)$

