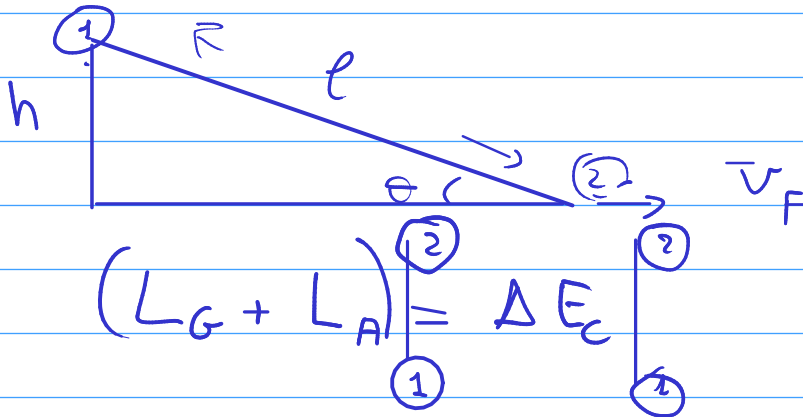
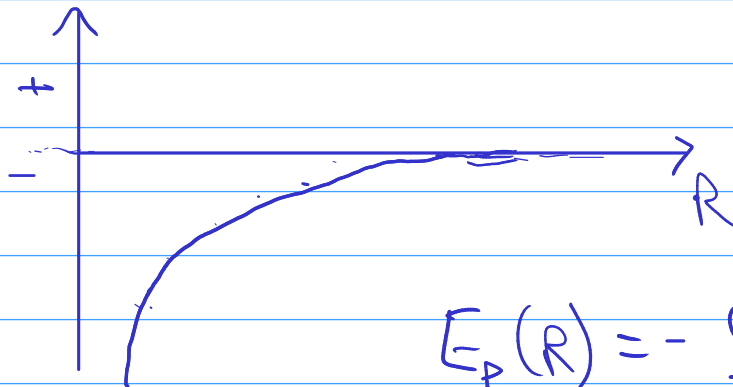


$$\frac{1}{2} m v_0^2 \rightarrow mgh \rightarrow h \rightarrow l$$

$$L_{\text{tot}} = L_A + L_G \implies -mgh$$



$$+mgh - (\mu_{\Delta} mg \cos \theta) \cdot l = \frac{1}{2} m v_f^2 - 0$$

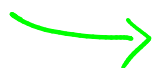


$$E_p(R) = - \frac{GMm}{R} \quad R > R_T$$

$$E_p(h) = mgh$$

$$R > R_T$$

$$E_p(R) = - \frac{GMm}{R_T + h} = - \frac{GMm}{R_T (1 + h/R_T)}$$



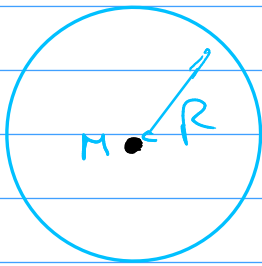
$$\epsilon = h/R_T$$

$$E_p \approx - \frac{GMm}{R_T} \cdot \left(1 - \frac{h}{R_T}\right)$$

$$= - \frac{GMm}{R_T} + \frac{GMm \cdot h}{R_T^2}$$

$$E_p(h) \approx E_p(R_T) + mgh$$

$$E_p(R_T) \equiv 0 \quad \Rightarrow \quad E_p(h) = mgh \quad !$$



$$E_p(R) = - \frac{GMm}{R}$$

$$E_c = \frac{1}{2} m v^2$$

$$a_c = \frac{v^2}{R}$$

$$a_c = \frac{GM}{R^2}$$

consideration
cinematica

dinamica

$$\rightarrow a_c = F_c/m$$

$$v^2 = \frac{GM}{R}$$

$$E_c = \frac{1}{2} m v^2 = \frac{1}{2} \frac{GMm}{R}$$

$$E_T^{(R)} = E_c + E_p = \frac{1}{2} \frac{GMm}{R} - \frac{GMm}{R} = - \frac{1}{2} \frac{GMm}{R}$$

(orbita circolare)

$$E_T(R) = -\frac{1}{2} \frac{GMm}{R}$$

$$< 0$$

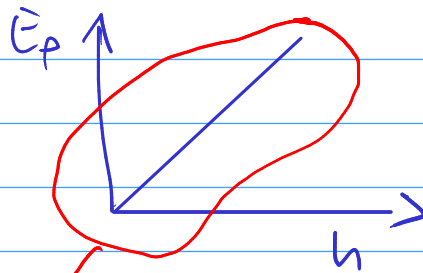
???

⇒ comp legato

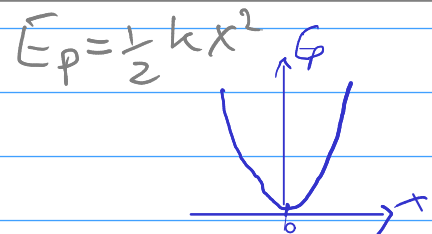
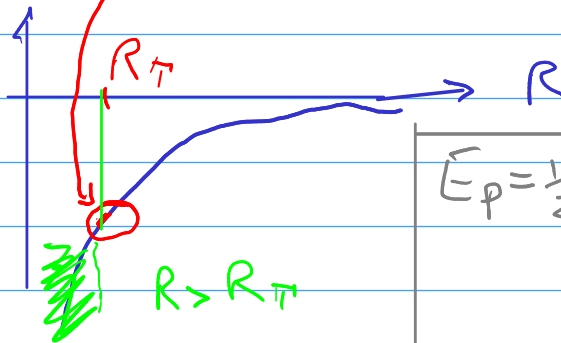
→ per liberarlo serve energia

(ed nel caso chiamato ionizzazione)

$$E_p = mgh$$



$$E_p = -\frac{GMm}{R}$$



molla

$$F = -kx \quad \longleftrightarrow$$

$$E_p = \frac{1}{2} kx^2$$

posto centro Terra

$$F = -k'r$$

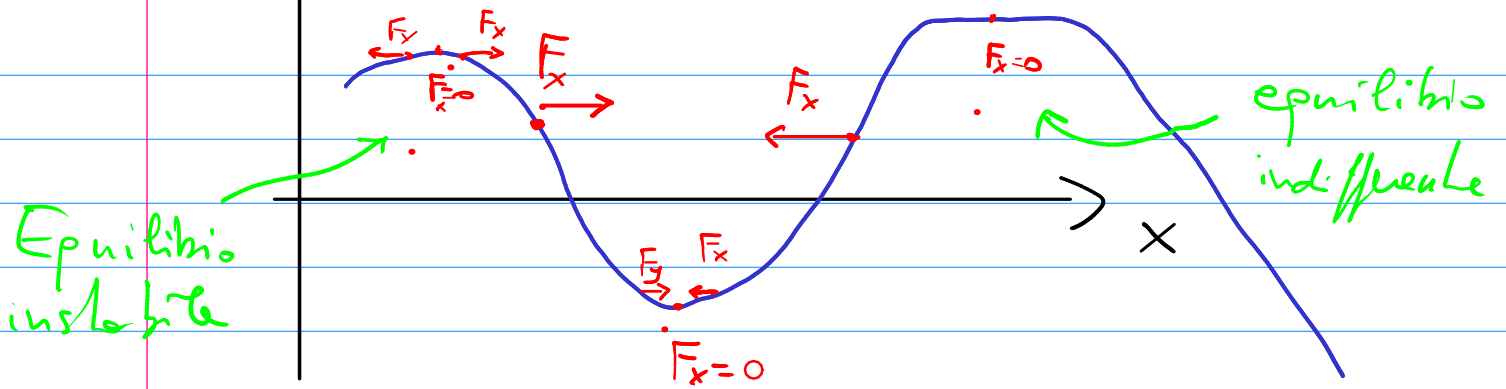
$$E_p = \frac{1}{2} k'r^2$$

$$\Delta E_p \Big|_{x_1}^{x_2} = -L \Big|_{x_1}^{x_2} = - \int_{x_1}^{x_2} F dx$$

$$F = -\frac{d}{dx} E_p(x)$$

$E_p(x)$

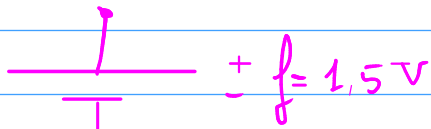
$E_p(x) \Rightarrow F(x) = -\frac{dE_p}{dx}$



Equilibrio stabile

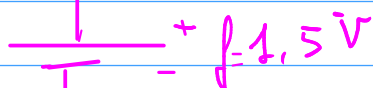
$E_p(x) \rightarrow E_p(x) + k$
non cambia niente!

V_2



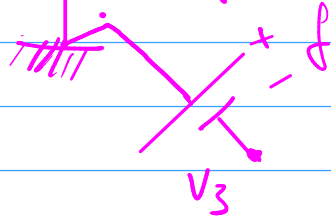
$V_1 = V_0 + 1.5V$
 $= V_0 + 1.5J/C$

V_1



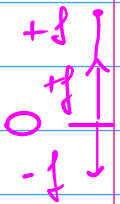
$V_1 - V_0 = f \Rightarrow V_1 = V_0 + f$

$V_0 = 0$



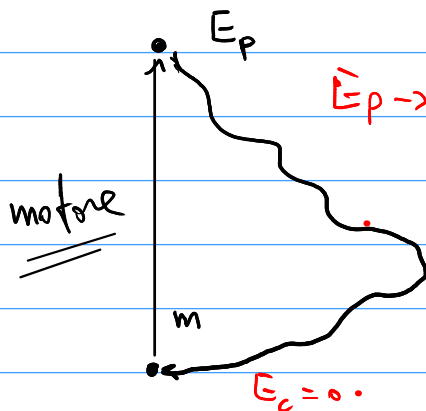
$V_2 - V_1 = f \Rightarrow V_2 = V_1 + f$
 $= V_0 + 2f$

$V_3 = -1.5V$

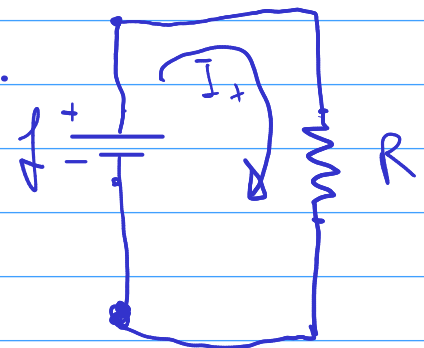


$V_1 - V_3 = 2f$

h



$E_p \rightarrow E_e \rightarrow E_{\text{Termica}}$



$h=0$

Impieghi rischiosi \rightarrow fontana