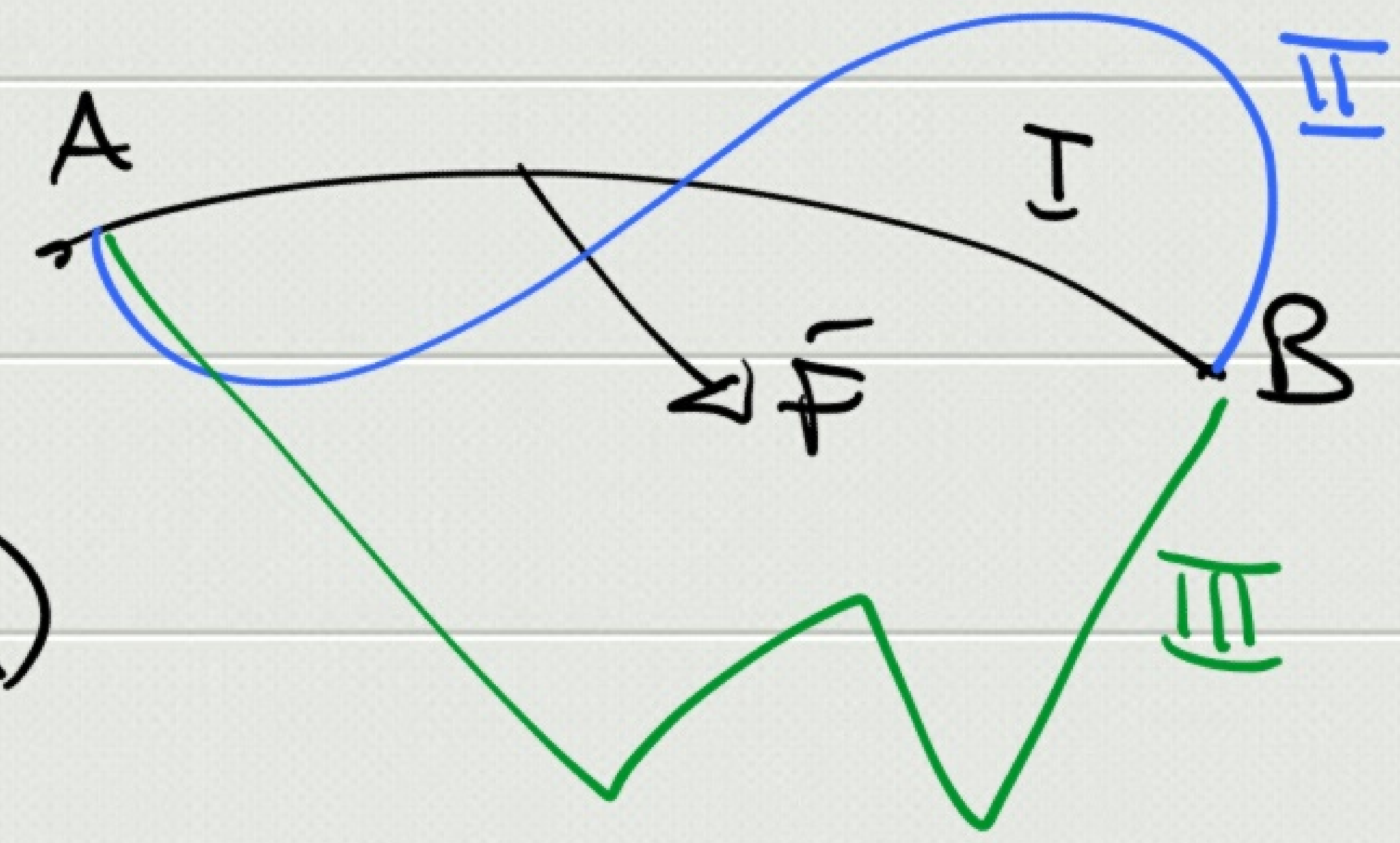
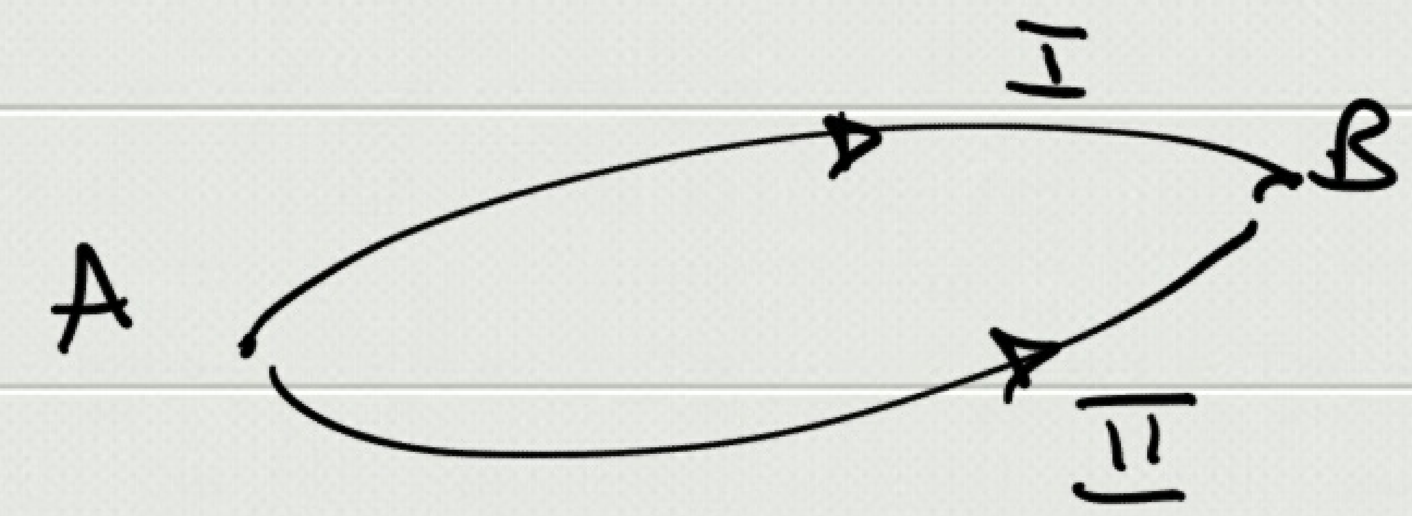
$$W_{A\to B} = \int_A^B \bar F \, d\bar s = -\Delta E_p =$$



$$= -(E_{p,B} - E_{p,A})$$

$$W_{A\to B} = \int_A^B (\bar F \, d\bar s)_{I} = \int_A^B (\bar F \, d\bar s)_{II} = \int_A^B (\bar F \, d\bar s)_{III} = -\Delta E_p$$

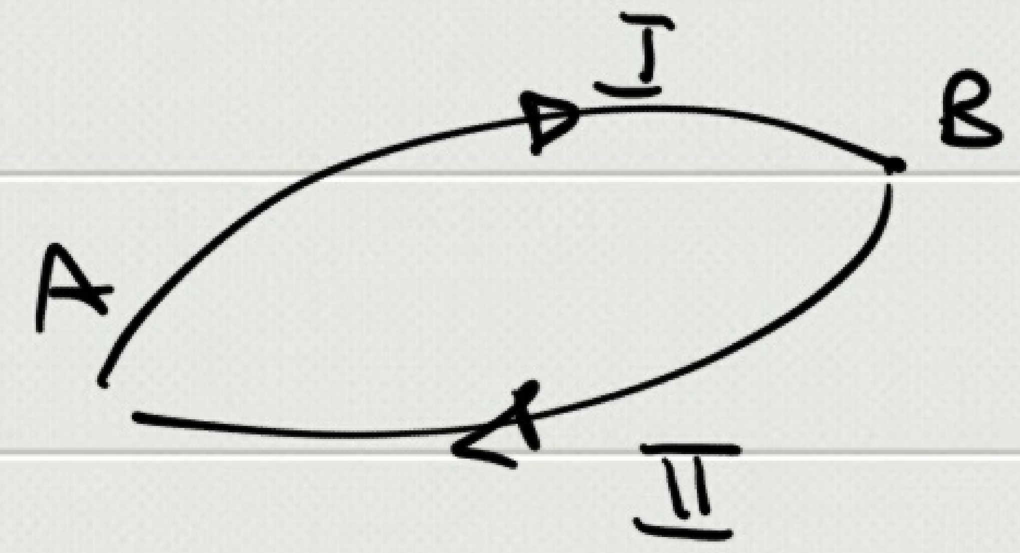


$$\int_A^B (\bar F \, d\bar s)_{I} = \int_A^B (\bar F \, d\bar s)_{II}$$

$$\int_A^B (\bar F \, d\bar s)_{I} - \int_A^B (\bar F \, d\bar s)_{II} = 0 \qquad *$$

$$W_{A\to B} = \int_A^B \bar F \, d\bar s = -(E_{p,B} - E_{p,A}) = -\left[-(E_{p,A} - E_{p,B})\right] =$$

$$= -\int_B^A \bar F \, d\bar s = -W_{B\to A}$$



$$\int_A^B (\bar F \, d\bar s)_{I} + \int_B^A (\bar F \, d\bar s)_{II} = 0$$

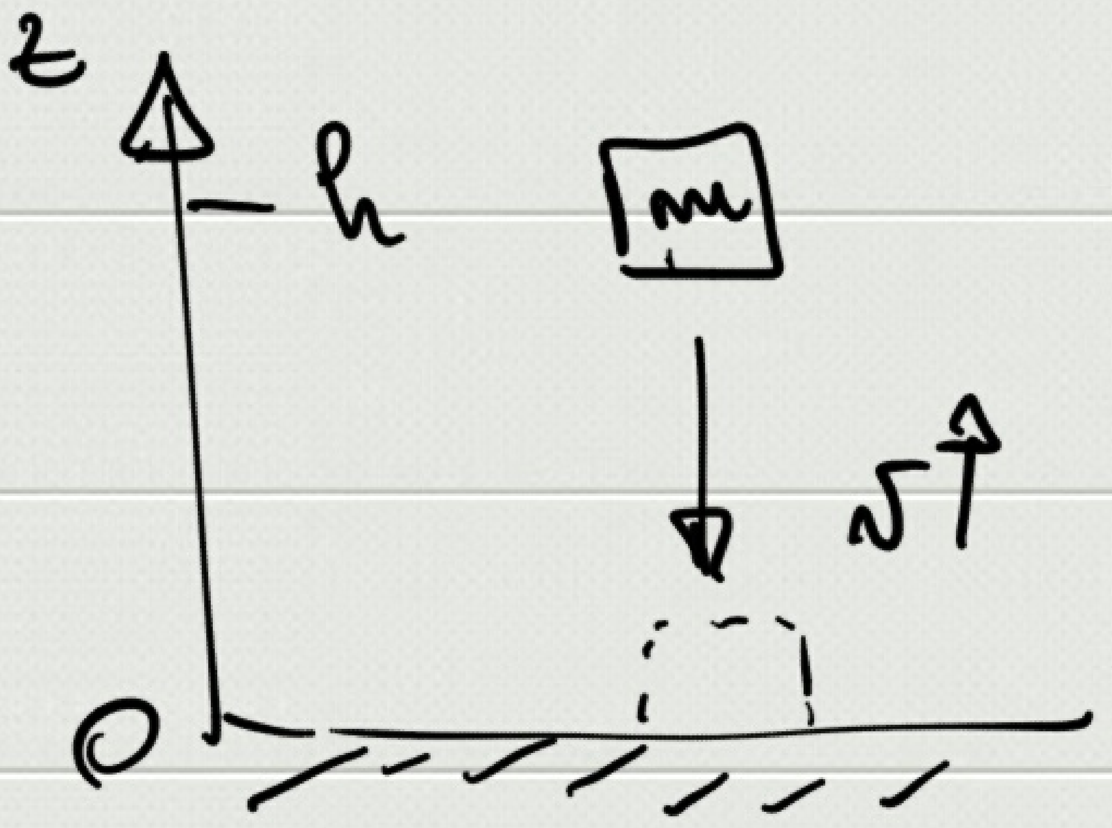
$$\boxed{\oint \bar F \, d\bar s = 0}$$

(circuitazione)

forze conservative

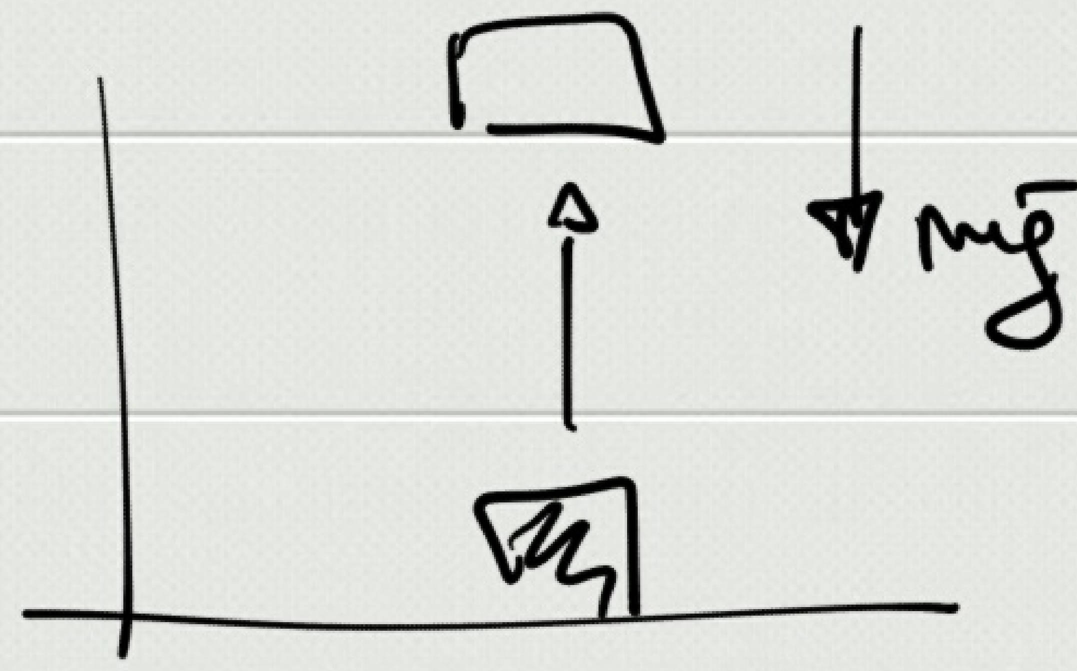
Forze conservative $\boxed{W_{A\to B} = -\Delta E_p} \Rightarrow \oint \bar{F}\, d\bar{s} = 0$

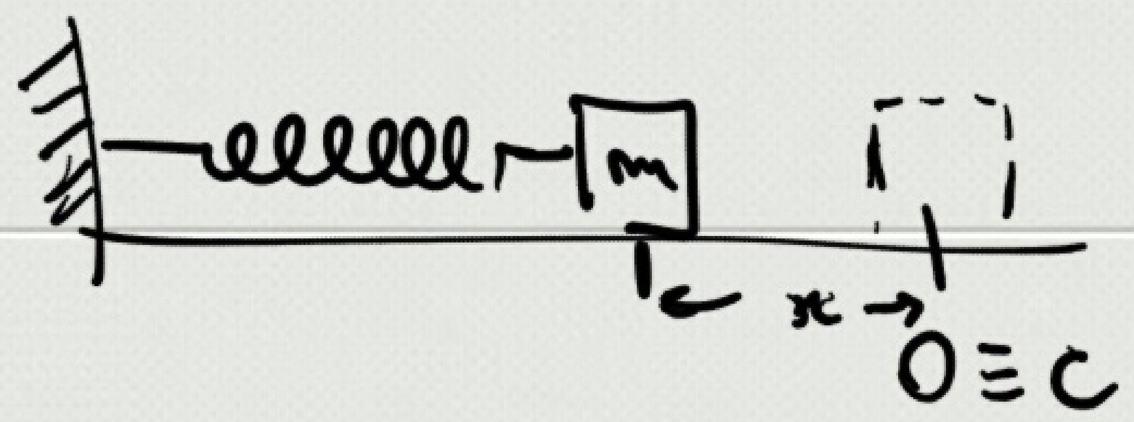
$$W_{A\to B} = \underset{\text{inizio}}{E_{p,A}} - \underset{\text{fine}}{E_{p,B}} \quad \begin{cases} >0 \ : \ \text{motore} \Rightarrow E_{p,in} > E_{p,fin} \\ <0 \ : \ \text{resistente} \Rightarrow \ '' < '' \end{cases}$$



$E_p = mgh$

$E_p = 0$



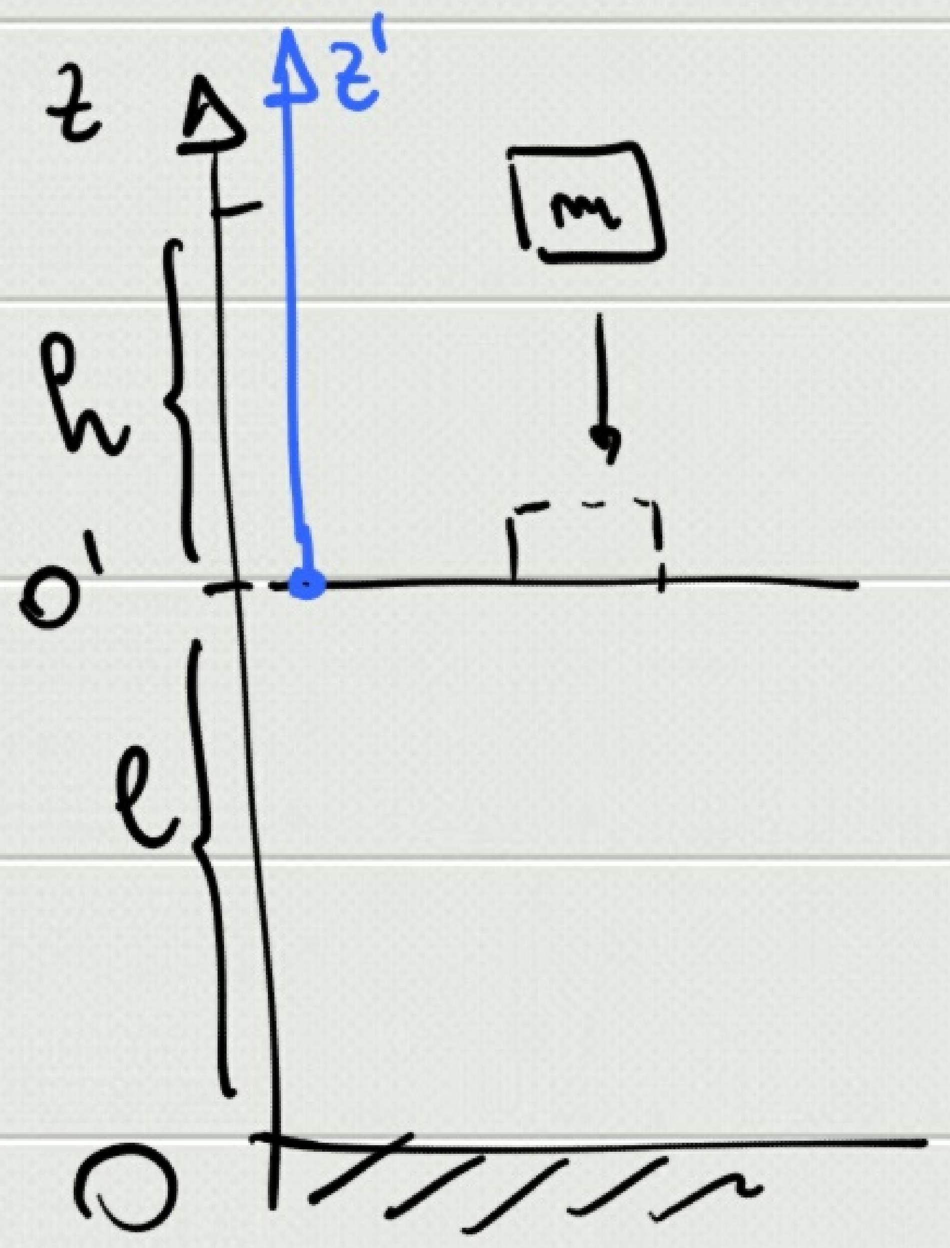


$E_p = \frac{1}{2} k x^2$

$W_{A\to B} = -\Delta E_p = -(E_{p,B} - E_{p,A})$

$E_{p,peso} = mgz + cost$

$\Uparrow$



$$\left.\begin{array}{ll} E_p = mg(l+h) & E'_p = mgh \\ E_p = mgl & E'_p = 0 \end{array}\right\} \Delta E_p = -mgh$$

$E'_p = mgz - mgl$

Forze conservative : $W = -\Delta E_p$

Forze non conservative : $\cancel{W = -\Delta E_p}$

(dissipative)

$\left.\right\} \boxed{W_{A\to B} = \Delta E_K}$

Forze conservative

$$\left.\begin{aligned} W_{A\to B} &= -\Delta E_p = -(E_{p,B} - E_{p,A}) \\ &\overset{!}{=} \Delta E_K = E_{K,B} - E_{K,A} \end{aligned}\right\} \Longrightarrow$$

$$E_{K,B} + E_{p,B} = E_{K,A} + E_{p,A}$$

$\boxed{E_m = E_K + E_p}$ → energia meccanica

$\Longrightarrow \boxed{E_{m,B} = E_{m,A}}$ Principio di conservazione dell'energia meccanica

Forze non conservative

$$\Rightarrow \quad W_{TOT, A\to B} = W_{n.c, A\to B} + W_{cons. A\to B} =$$

$$\left.\begin{aligned} &= W_{nc} - \Delta E_p \\ &\overset{!}{=} \Delta E_{K, A\to B} \end{aligned}\right\} \Rightarrow$$

$$W_{nc} = \Delta E_K + \Delta E_p = \Delta (E_K + E_p) = \Delta E_m$$

$$\boxed{W_{nc, A\to B} = E_{m,B} - E_{m,A}}$$