Potential Energy & conservation of Energy

Forces

- non Conservative
  Ex: friction

- Conservative
  Ex: mg / F_{spring}
  proprieties :-
  1- Path independant
  2- $W_{F\,cons} = 0$ when around a closed loope
  3- $W_{F\,cons} = -\Delta U$

- Conservative forces
  - Gravitational Potential Energy

    $U_g = mg\,\Delta y$

    when $y_i = 0$:-

    $U_g = mgy$ Joul

  - Spring Potential energy

    $U_s = \frac{1}{2}k(x_f^2 - x_i^2)$

    when $x_i = 0$

    $U_s = \frac{1}{2}kx^2$ Joul

- Conservation of Mechanical Energy

  $E_{mec} = K + U$ (when F acting is conservative)

  $\to W_{net} = W_{cons}$

  $\to (K+U)_1 = (K+U)_2$

Alaa Etaiwi

Remark ⚠ :-

when the system consists of Conservative and non-conservative forces :-

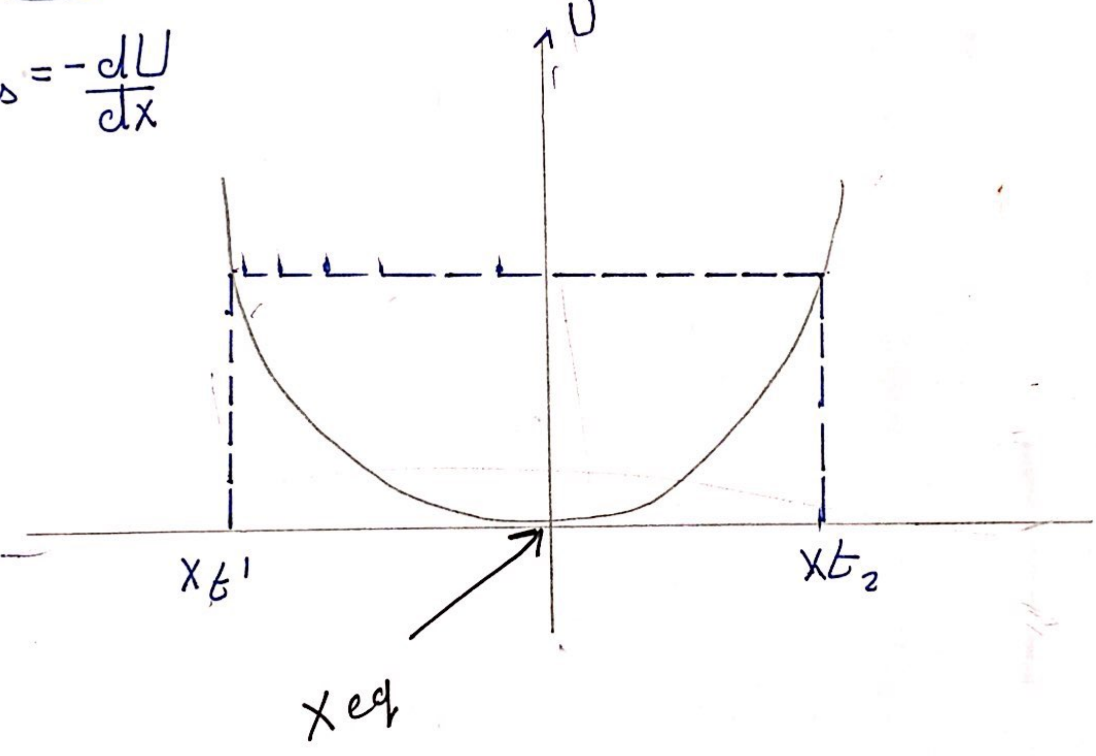
$W_{cons} + W_{noncons} = \Delta K$

$-\Delta U + W_{non\,cons} = \Delta K$

$\boxed{W_{non\,cons} = \Delta E} = \Delta U + \Delta K$

Reading a Potential Energy Curve

$F_{cons} = -\frac{dU}{dx}$



x_{t_1}, x_{t_2} :- Turning Points → K=0
→ E=U

x_{eq} :- equilibriam Point → U=0 → E=K
→ F=0

Alaa Haiwi