Corrigé Exercices énergie : 10 et E6 classe !!

E1 Proton

Proton : $m = 1{,}67 \cdot 10^{-27}\,kg$

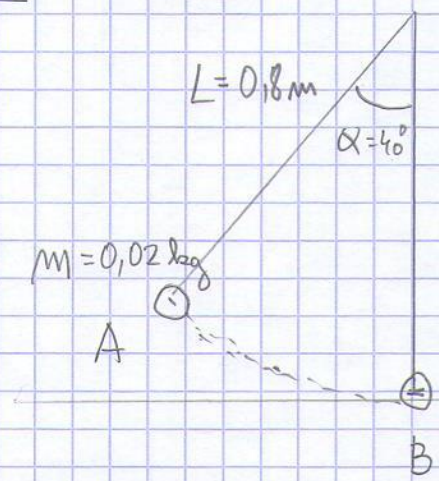
$W_{freinage}$

TEC : $\frac{1}{2} m (v_1^2 - v_1^2) = -F \cdot x$

$F = \frac{\frac{1}{2} m (v_1^2 - v_2^2)}{x}$

$= \ldots$

E2 Pendule



Energie mécanique :

en A : $E_A = m \cdot g L (1 - \cos\alpha) + 0$

en B : $E_B = 0 + \frac{1}{2} m v^2$

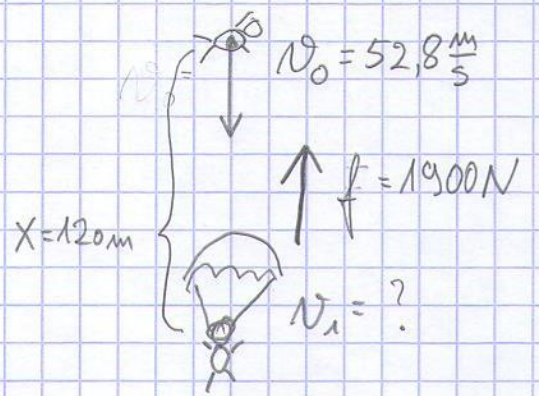
Conservation : $\frac{1}{2} m v^2 = m \cdot g L (1 - \cos\alpha)$

(niv z = 0 ; $E_p = 0$)

$v = \sqrt{2 g L (1 - \cos\alpha)}$

$= \ldots$

E3 Parachutiste



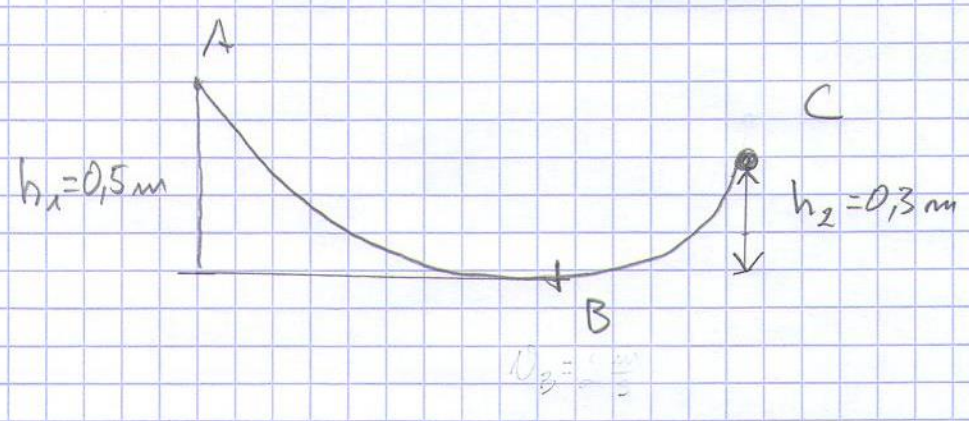
$W_{freinage}$ W_{poids}

TEC : $\frac{1}{2} m (v_1^2 - v_0^2) = -f \cdot x + m \cdot g \cdot x$

$v_1 = \sqrt{\frac{2(-f \cdot x + m \cdot g \cdot x)}{m} + v_0^2}$

$= \ldots$

E4 Perle



a) Sans frottement : $v_A = 0 \rightarrow v_B = 2\frac{m}{s}$

TEC : $\frac{1}{2} m v_B^2 = m \cdot g \cdot h_1$

$\Rightarrow h_1 = \frac{v_B^2}{2g} = \ldots$

b) avec frottement $v_A = 0 \rightarrow v_C = 0$

Variation de l'énergie mécanique :

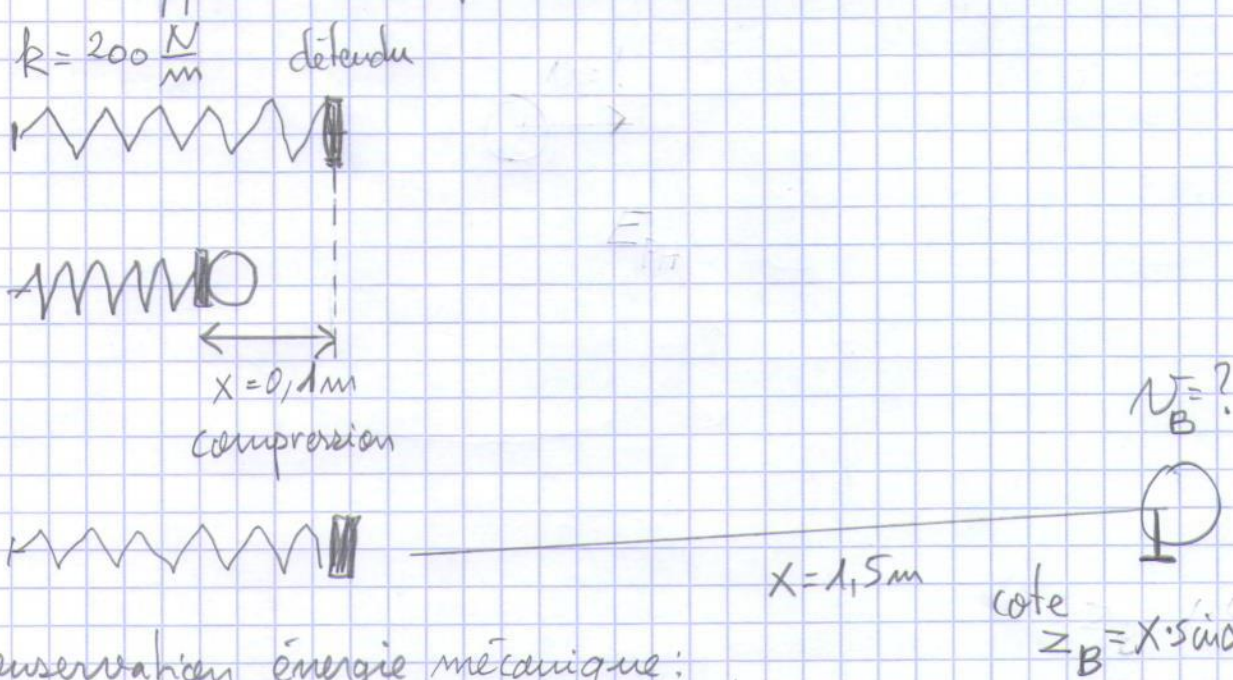
$E_A = m \cdot g \cdot h_1 + 0$

$E_B = m \cdot g \cdot h_2 + 0$

$\Delta E_{mec} = m \cdot g \cdot (h_2 - h_1) = \underbrace{-f \cdot x}_{W \text{ freinage}}$

$f = \frac{m \cdot g \cdot (h_1 - h_2)}{x} = \ldots$

E5 Flipper (sans frottement ni masse du lanceur à ressort)



Conservation énergie mécanique:

a) $E_A = \frac{1}{2} k x^2 = E_B = \frac{1}{2} m v_B^2$

Horizontal: $\Rightarrow v_B = \sqrt{\frac{k x^2}{m}} = \ldots$

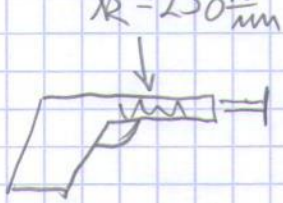
b) $E_A = \frac{1}{2} k x^2 = E_B = \frac{1}{2} m v_B^2 + m \cdot g z_B$

Inclinaison 5°:

$$k x^2 - 2 m g z_B = m v_B^2$$

$$v_B = \sqrt{\frac{k x^2}{m} - 2 g z_B} = \ldots$$

E7



$x = l - l_0$
$= 0,08m$

a) horizontal

sans frott $v = \sqrt{\frac{k x^2}{m}}$

T.E.C. avec frott $\frac{1}{2} m v^2 = \frac{1}{2} k x^2 - f \cdot x$

$$v = \sqrt{\frac{k x^2}{m} - \frac{2 f x}{m}}$$

b) vertical sans frott

Cons E_{mec}: $\frac{1}{2} k x^2 = m \cdot g h \quad \Rightarrow h = \frac{\frac{1}{2} k x^2}{m g}$