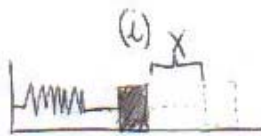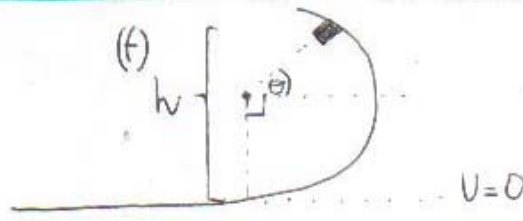PAUTA EJERCICIO 8.
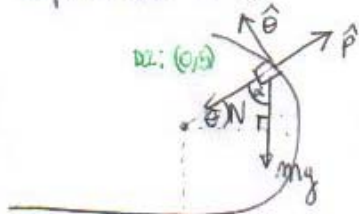
(i)

Compresión = X

(f)

$\theta = 45$

$U = 0$

Ocupamos conservación de energía entre los instantes (i) y (f)

$E_i = \frac{1}{2} K X^2$ ①

$E_f = \frac{1}{2} m v^2 + mgh$ ① con $h = R + R\,\text{sen}\,\theta$

Luego $E_i = E_f \Rightarrow \frac{1}{2} K X^2 = \frac{1}{2} m v^2 + mgh$ (*) Incógnitas X, v.
(0,5)

Ocupando DCL en (f)

DCL: (0,5)

$\sum F \hat{\rho}: \quad -N - mg\cos\alpha = -m\frac{v^2}{R}$ ①

$\alpha = 90 - \theta \quad \cos(90-\theta) = \text{sen}\,\theta$

$\Rightarrow -N - mg\,\text{sen}\,\theta = -m\frac{v^2}{R}$

Pero, para $\theta = 45 \quad N = 0$

$\Rightarrow -mg\,\text{sen}\,45 = -m\frac{v^2}{R}$

$\Rightarrow v^2 = Rg\,\text{sen}\,45 = Rg\,\text{sen}\,\theta$ ①

Reemplazando en (*)

$\frac{1}{2} K X^2 = \frac{1}{2} m Rg\,\text{sen}\,\theta + mg[R + R\,\text{sen}\,\theta]$

$\frac{1}{2} K X^2 = \frac{1}{2} m Rg\,\text{sen}\,\theta + mgR + mgR\,\text{sen}\,\theta \quad / \cdot 2$

$K X^2 = 3mgR\,\text{sen}\,\theta + 2mgR = mgR(3\,\text{sen}\,\theta + 1)$.

$\Rightarrow X^2 = \frac{mgR}{K}(3\,\text{sen}\,\theta + 2)$.

$\therefore X^2 = \frac{mgR}{K}\left(3\frac{\sqrt{2}}{2} + 2\right)$ ①