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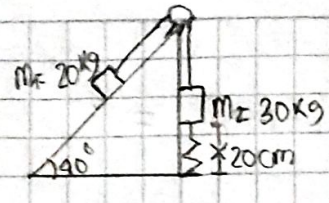
1)



Datos → $m_1 = 20\,kg$ $m_2 = 30\,kg$.

$K = 250\,N/m$ $x = 0.200\,m$.

Por Conservación de Energía [C.E.]

$C\epsilon \rightarrow E_{M0} = E_{MF}$

$\cancel{1/2 m V_{10}^2}^{\,0} + \cancel{1/2 m V_{20}^2}^{\,0} + m_2 g h_1 + 1/2 K X_0^2 = 1/2 m_1 V_{1f}^2 + 1/2 m_2 V_{f2}^2 + m_1 g h_2 + \cancel{1/2 K X_f^2}^{\,0}$

$\rightarrow m_2 g h + 1/2 K X_0^2 = 1/2 m_1 V_{1f}^2 + 1/2 m_2 V_f^2 + m_1 g h. \rightarrow V_1 = V_2 = V_{fs}$

Tenemos $h_1 = x \rightarrow h_1 = 0.200\,m$

$h_2 \rightarrow \text{Sen}\,40° = \frac{h_2}{x} \rightarrow h_2 = x\,\text{Sen}\,40°$

- Reordenamos y factorizamos.

$m_2 g h_1 + 1/2 K x^2 - m_1 g h_2 = 1/2 V_f^2 (m_1 + m_2)$

Sustituimos → $g x (m_2 - m_1 \text{Sen}\theta) + 1/2 K x^2 = 1/2 V_f^2 (m_1 + m_2)$

$\rightarrow V_f^2 = \frac{2 \cdot g x (m_2 - m_1 \text{Sen}\theta) + K x^2}{(m_1 + m_2)}$

$V_f = \sqrt{\frac{2 \cdot g x (m_2 - m_1 \text{Sen}\theta) + K x^2}{(m_1 + m_2)}}$

$V_f = \sqrt{\frac{2 \cdot (9.81)(0.20) \cdot [(30) - (20)\text{Sen}\,40] + (250)(0.20)^2}{20 + 30}}$

$V_f = \sqrt{\frac{(3.924) \cdot (17.14424) + 10}{50}} \rightarrow \boxed{V_f = 1.24\,m/s}$

$E_K = E_{K_f} - E_{K_0} \rightarrow E_K = 1/2 m V_f^2 - 1/2 m V_0^2$

$E_K = 1/2 (30)(1.24)^2 - \cancel{1/2 (30) \cdot 0}^{\,0} \rightarrow \boxed{E_K = 23.064\,J}$ B)

$E_p \rightarrow m \cdot g h_f - m \cdot g h_o$

$E_p = (20) \cdot (9.81)(40) \cdot \text{Sen } 40° - (20) \cdot (9.81) \cdot (20) \text{ Sen } 40° =$

$E_p = 25.2 \text{ J}$ C)

Sabemos $W_g = w \cdot dy \cdot \cos\theta \rightarrow W_g = m \cdot g \, dy \cdot \cos\theta$

$W_g = (30) \cdot (9.81) \cdot (0.20) \cdot \cos(180) \rightarrow W_g = -58.8 \text{ J}$ D)

$E_{P_R} = E_{P_{Rf}} - E_{P_{Ro}}$

$E_{P_R} = -\left[\frac{K}{2} x_f^2 - \frac{K}{2} x^2\right] \rightarrow E_{P_R} = -\left[\frac{250}{2} \cdot (0)^2 - \frac{250}{2} (0.20)^2\right]$

$E_{P_R} = -\left[-\frac{250}{2} (0.20)^2\right] \rightarrow E_{P_R} = 5 \text{ J}$ E)

2) a) Por C. E. →

→ $E_{P_E} = E_K$

$\frac{1}{2} K x^2 = \frac{1}{2} m v_B^2 \rightarrow x^2 = \frac{m \cdot v_B}{K}$

$$x = \sqrt{\frac{m \cdot v_B}{K}}$$

b) Por C. E

$$E_{K_1} + E_P = E_{K_2} + W_R$$

→ $\frac{1}{2} m v_2^2 + mg\,2R = \frac{1}{2} m v_1^2 - \pi R F_f \rightarrow v_2^2 = v_1^2 - \frac{2\pi R F_f}{m} - 4gR$

→ $$v_2 = \sqrt{v_1^2 - \frac{2\pi R F_f}{m} - 4gR}$$

c) Si $\vec{v}_T$ es mayor o igual que el peso del bloque.

$m \cdot \frac{v^2}{R} = m \cdot g \rightarrow v^2 = \frac{m \cdot g \cdot R}{m} \rightarrow$ $$v = \sqrt{g \cdot R}$$