Examen 2da Unidad — Colín Ramiro Jael

1.- a) Enuncia la primer ley de Newton

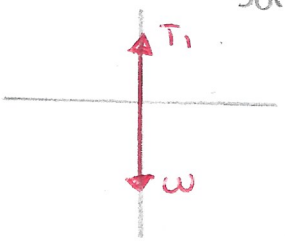
R= Todo cuerpo permanecerá en reposo ó movimiento a una velocidad constante a menos que una fuerza interactúe con su medio

b) ¿Que es la inercia?

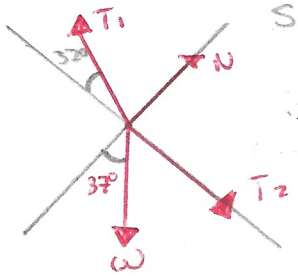
R= Es una propiedad que se opone al cambio de movimiento

c) Dada la siguiente configuración mecánica, dibujar el D.C.L correspondiente para cada cuerpo, considerando que las cuerdas generan una tensión y el sistema debe estar en reposo

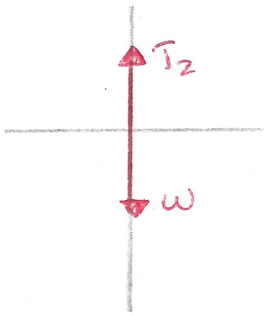
burro



Shrek

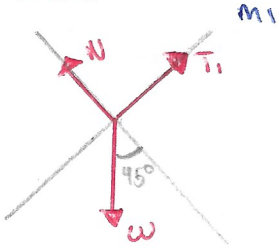


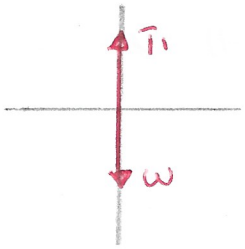
gato



2.- D.C.L

m1





Datos

$m_1 = 5\,kg$

$m_2 = 8\,kg$

$\theta = 45°$

$\Sigma F = ma$

$\Sigma F_x = T_1 - w\,sen\theta = ma \ldots ①$

$a = \frac{T_1 - w\,sen\theta}{m_1}$

$\Sigma F_y = N - w\cos\theta = 0$

$\Sigma F = ma$

$\Sigma F_x = 0$

$\Sigma F_y = m_2 g - T_1 = mg$

$T_1 = m_2 g - m_2 a \ldots ②$

Sustituyendo ② en ①

$(m_2 g - m_2 a) - mg\,sen\theta = ma$

$m_2 g - m_2 a - mg\,sen\theta = m_1 a$

$m_2 g - m_1 g\,sen\theta = m_1 a + m_2 a$

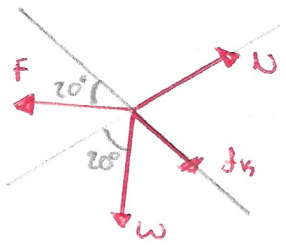
$a(m_1 + m_2) = g(m_2 - m_1 sen\theta)$

$a = \frac{g(m_2 - m_1 sen\theta)}{m_1 + m_2} \rightarrow a = \frac{9.8(8 - 5\,sen\,45)}{5+8} \rightarrow a = 3.36\,m/s^2$

$T_1 = 8(9.8) - 8(3.36)$

$T_1 = 51.52\,N$

3- D.C.L



Datos

$m = 2.2\,kg$

$\Delta x = 3.1\,m$

$\theta = 20°$

$F = 16\,N$

$\mu_k = 0.2$

$V_0 = 0.8\,m/s$

Formulas

$f_k = \mu_k N$

$W_{Total} = \Delta K = \frac{1}{2} m V_f^2 - \frac{1}{2} m V_0^2$

$V_x^2 = V_0^2 + 2a_x \Delta x$

$\Sigma F = ma$

$\Sigma F_x = F\cos\theta - w\sin\theta - f_k = ma \quad \ldots (1)$

$\Sigma F_y = N - w\cos\theta = 0$

$N = w\cos\theta$

$N = 2.2(9.8)\cos 20$

$N = 20.25 \rightarrow f_k = 0.2(20.25) \rightarrow f_k = 4\,N$

(1) $a = \frac{F\cos\theta - mg\sin\theta - f_k}{m} = F\cos\theta - g\sin\theta - f_k = 16\cos 20 - 9.8\sin 20 - 4$

$a = 1.15\,m/s^2$

$V_x^2 = V_0^2 + 2(1.15)(3.1) = 7.67$

$W_{Total} = \frac{1}{2} m V_f^2 - \frac{1}{2} m V_0^2 = \frac{1}{2}(2.2)(7.67) \rightarrow W_{Total} = 7.84\,J$ a)

$V_x = \sqrt{0.8^2 + 2(1.15)(3.1)}$

b) $V_x = 2.78\,m/s$

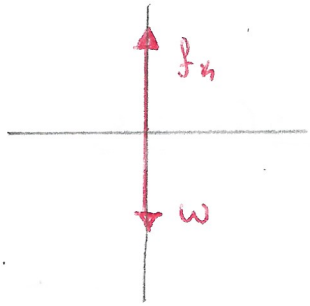
4- Datos

$m = 2000\,kg$

$V_0 = 25\,m/s$

$\Delta y = 3\,m$

$f_k = 17000\,N$



$k = \frac{F}{\Delta y}$

$w = 2000(9.8)$

$w = 19600\,N$

$\Delta K = K_f - K_0 = \frac{1}{2} m V_f^2 - \frac{1}{2} m V_0^2$

$\Delta K = -\frac{1}{2} m V_0^2$

$W_R = F_R \Delta x$

$F_n = k \Delta x \longrightarrow x_f = V_0 \sqrt{\frac{m}{k}} \rightarrow k = \frac{m}{\left(\frac{x_f}{V_0}\right)^2} = \frac{2000}{\left(\frac{3}{25}\right)^2}$

$k = 1.4198 \times 10^5\,N/m$

$1.41 \times 10^5\,N/m$

5.- Datos

$m = 0.5\ kg$

$k = 100\ N/m$

$x_f = 1\ m$

$x_0 = 0.2\ m$

$\mu_k = ?$

$f_k = \mu_k N$

$\mu_k = \frac{f_k}{N}$

$x_f = v_0 \sqrt{\frac{m}{k}}$

$N = (0.5)(9.8)$

$k = \frac{F}{\Delta x}$

$v_0 = \frac{x_f}{\sqrt{\frac{m}{k}}}$

$v_0 = 14.14\ m/s$

$a_x = \frac{v_0}{2\Delta x} = 11.13$

$F = k \Delta x$

$E_c = \frac{1}{2} m v_0^2 = 49.98\ J$

$\mu_k = 1.69$