

SOLUCIONES FINAL FISICA I 7-IX-04

Tomamos A(0,0) y el punto B(2,1) debe pertenecer a la trayectoria luego verifica la ecuación

$$y = x \tan \phi - \frac{1}{2} \frac{g x^2}{v_0^2 \cos^2 \phi} \Rightarrow 1 = 2 \tan 45 - \frac{1}{2} \frac{10 \cdot 2^2}{v_0^2 (\frac{\sqrt{2}}{2})^2}$$

$$\Rightarrow \boxed{v_0 = \sqrt{40} = 2\sqrt{10} \text{ (m/s)}}$$



a) $T = m_1 g + m_2 g = 2 \cdot 10 + 8 \cdot 10 = 100 \text{ N}$

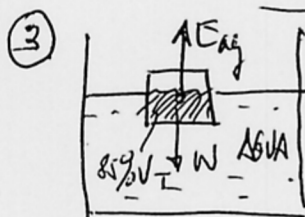
b) $W_1 \frac{a}{2} \sin \phi - W_2 \left(\frac{b}{2} \cos \phi - a \sin \phi \right) = 0$

$$a \left(\frac{W_1}{2} + W_2 \right) \sin \phi = W_2 \frac{b}{2} \cos \phi$$

$$a (W_1 + 2W_2) \sin \phi = W_2 b \cos \phi$$

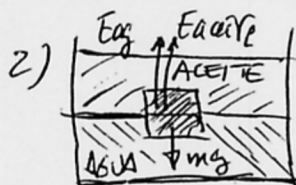
$$\tan \phi = \frac{W_2 b}{a (W_1 + 2W_2)} = \frac{8 \cdot 10 \cdot 1}{0.25 (2 \cdot 10 + 2 \cdot 80)} = \frac{80}{25}$$

$$\boxed{\phi = \arctan\left(\frac{80}{25}\right) = 72.646 = 72^\circ 38' 45''}$$



1) $E_{ag} = W \Rightarrow \rho_{ag} V_{sumerg} \cdot g = m_{auto} g = \rho_{auto} V_{total} g$

$$\boxed{\rho_{auto} = \frac{V_{sumerg}}{V_{tot}} \rho_{ag} = \frac{0.85 \sqrt{T}}{\sqrt{T}} 1000 = 850 \text{ kg/m}^3}$$



2) $E_{ag} + E_{acete} = m g \Rightarrow \rho_{ag} x V_T g + \rho_{ac} (1-x) V_T g = \rho_{auto} V_T g$

$$\rho_{ag} x + \rho_{ac} (1-x) = \rho_{auto} \Rightarrow \rho_{ag} x - \rho_{ac} x = \rho_{auto} - \rho_{acete}$$

$$x = \frac{\rho_{auto} - \rho_{acete}}{\rho_{ag} - \rho_{acete}} = \frac{850 - 800}{1000 - 800} = \frac{50}{200} = 0.25 \Rightarrow 25\% V_T$$

4) $1) m_f \vec{v}_f + m_{proj} \vec{v}_{proj} = m_f \vec{v}_f' + m_{proj} \vec{v}_{proj}' = 0 \Rightarrow m_f v_f' - m_{proj} v_{proj}' = 0$

$$v_{fused} = \frac{m_{proj}}{m_{fus}} v_{proj}' = \frac{0.01}{5} 500 = 1 \text{ m/s}$$

2) $E_{c_{fused}} = E_{p_{auto}} \Rightarrow \frac{1}{2} m_f v_{fus}'^2 = m_f g h \Rightarrow h = \frac{v_{fus}'^2}{2g} = \frac{1^2}{2 \cdot 10} = 5 \cdot 10^{-2} \text{ m} = 5 \text{ cm}$

3) $m_f \vec{v}_f + m_{proj} \vec{v}_p = 0 = m_T \vec{v}_{cm} \Rightarrow \boxed{\vec{v}_{cm} = 0}$

4) $2T = \frac{m_f v_f'^2}{R} + m_f g \Rightarrow \frac{(5 \cdot 10^{-2})^2}{2} + 5 \cdot 10 = \frac{60}{2} = 30 \text{ N}$