Πα 22-1-2021

B+2

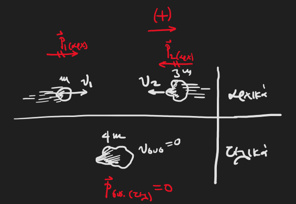
1ο ΓΕΛ ΣΑΛΑΜΙΝΑΣ

19 ΦIII

m, K, $3m$ } πλαστ.

$v_{συσ.} = 0$

$Q = |\Delta K| = ?$



Επειδή $\vec{v}_{συσ.} = 0 \Rightarrow \vec{p}_{συσ} = 0$
αλλά λόγω ΑΔΟ $\vec{p}_{συσ} = \vec{p}_{ολ,αρχ} \Rightarrow$
$\Rightarrow \vec{p}_{ολ(αρχ)} = 0 \Rightarrow \vec{p}_1 + \vec{p}_2 = 0 \Rightarrow$
$\Rightarrow \vec{p}_2 = -\vec{p}_1 \Rightarrow$ το 3m κινείται με αντίθετη ορμή από το m → ίδιο μέτρο, αντίθετη κατ.

• <u>ΑΔΟ</u>: $p_{ολ} = \cancel{p'_{ολ}}^{0} \Rightarrow p_1 - p_2 = 0 \Rightarrow p_1 = p_2 \Rightarrow \cancel{m} v_1 = 3\cancel{m} v_2 \rightarrow \boxed{v_2 = \frac{v_1}{3}}$

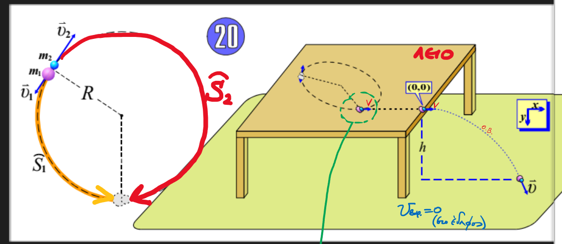
• $K_{ολ}^{τελ} = 0$

• $K_{ολ}^{αρχ} = K_1 + K_2 = \frac{1}{2} m v_1^2 + \frac{1}{2} 3m v_2^2 = \frac{1}{2} m v_1^2 + \frac{1}{2} \cancel{3} m \frac{v_1^2}{\cancel{9}_3} = \frac{1}{2} m v_1^2 + \frac{1}{3}\frac{1}{2} m v_1^2 =$

$= K + \frac{1}{3} K = \frac{4}{3} K$

• $\Delta K = K_{ολ}^{τελ} - K_{ολ}^{αρχ} = 0 - \frac{4}{3} K = -\frac{4}{3} K$

• $Q = |\Delta K| \Rightarrow \boxed{Q = \frac{4}{3} K} \rightsquigarrow$ (B.)



$R = 2\ m$
$\upsilon_1 = 10\ m/s$
$\upsilon_2 = 20\ m/s$
$m_1 = 4\ kg$
$m_2 = 1\ kg$
$g = 10\ m/s^2$

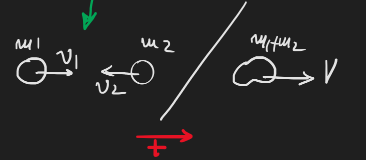
$\Delta 1_a$. $t_{συναντησης} = ?$
$\Delta 1_b$. $\widehat{S}_1 = ?$
Δ2. $\Delta K_{κρουσης} = ?$
Δ3. $h = ?$
... $\upsilon = 6\ m/s$

Δ4. οι συντεταγμένες (x,y) του σημείου της τροχιάς, για τις οποίες η γωνία που σχηματίζει η ταχύτητα του σώματος με τον ορίζοντα έχει εφαπτομένη ίση με ½.

Δ1) $\widehat{S}_1 + \widehat{S}_2 = 2\pi R \Rightarrow v_1 \cdot t + v_2 \cdot t = 2\pi R \Rightarrow 10 \cdot t + 20 \cdot t = 2\pi \cdot 2 \Rightarrow 30t = 4\pi \rightarrow t = \frac{4\pi}{30} \Rightarrow \boxed{t = \frac{2\pi}{15}\ sec}$

$\widehat{S}_1 = v_1 \cdot t = 10 \cdot \frac{2\pi}{15} = \frac{20\pi}{15} \Rightarrow \boxed{\widehat{S}_1 = \frac{4\pi}{3}\ m}$

Δ2)



• <u>ΑΔΟ</u>: $\vec{p}_1 + \vec{p}_2 = \vec{p}_{συσ} \Rightarrow p_1 - p_2 = p_{συσ} \Rightarrow$
$\Rightarrow m_1 v_1 - m_2 v_2 = (m_1 + m_2) V \Rightarrow$
$\Rightarrow 4 \cdot 10 - 1 \cdot 20 = (4+1) \cdot V \Rightarrow$
$\Rightarrow 40 - 20 = 5 \cdot V \Rightarrow 20 = 5 \cdot V \Rightarrow$
$\Rightarrow \boxed{V = 4\ m/s}$

• $\boxed{\Delta K_{κρούσης}} = K_{ολ}^{τελ} - K_{ολ}^{αρχ} = \frac{1}{2}(m_1 + m_2) V^2 - \left(\frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2\right) =$

$= \frac{1}{2}(4+1) \cdot 4^2 - \left(\frac{1}{2} \cdot 4 \cdot 10^2 + \frac{1}{2} \cdot 1 \cdot 20^2\right) =$

$= \frac{1}{2} \cdot 5 \cdot 16 - \frac{1}{2} \cdot 4 \cdot 100 - \frac{1}{2} \cdot 400 =$

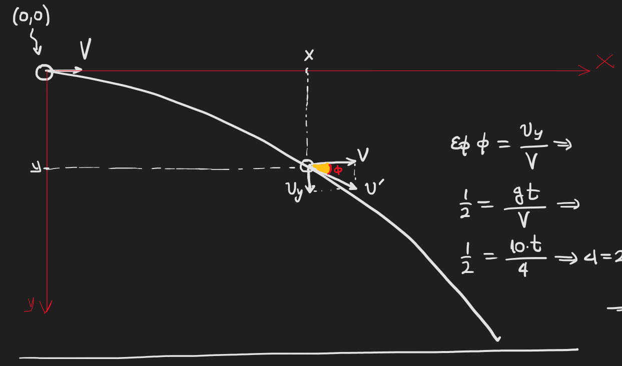
$= 40 - 200 - 200 = \boxed{-360\ Joule}$

Δ3) <u>ΑΔΜΕ</u>: $K + U = K' + \cancel{U'}^{0} \Rightarrow$

$\Rightarrow \frac{1}{2}\cancel{(m_1+m_2)} V^2 + \cancel{(m_1+m_2)} g h = \frac{1}{2}\cancel{(m_1+m_2)} v^2 \Rightarrow$

$\Rightarrow \frac{1}{2} \cdot 4^2 + 10 \cdot h = \frac{1}{2} 6^2 \Rightarrow 8 + 10h = 18 \Rightarrow$
$\rightarrow 10h = 10 \Rightarrow \boxed{h = 1\ m}$

Δ4)



$εφ\,\phi = \frac{v_y}{V} \Rightarrow$

$\frac{1}{2} = \frac{gt}{V} \Rightarrow$

$\frac{1}{2} = \frac{10 \cdot t}{4} \Rightarrow 4 = 20t \Rightarrow t = \frac{4}{20} \Rightarrow$

$\rightarrow \boxed{t = 1/5\ sec}$

$x = V \cdot t = 4 \cdot \frac{1}{5} \Rightarrow \boxed{x = 0{,}8\ m}$

$y = \frac{1}{2} g t^2 = \frac{1}{2} \cdot 10 \left(\frac{1}{5}\right)^2 = 5 \cdot \frac{1}{25} \Rightarrow$

$\rightarrow \boxed{y = 0{,}2\ m}$

$\boxed{(x,y) = (0{,}8\ ,\ 0{,}2)}$