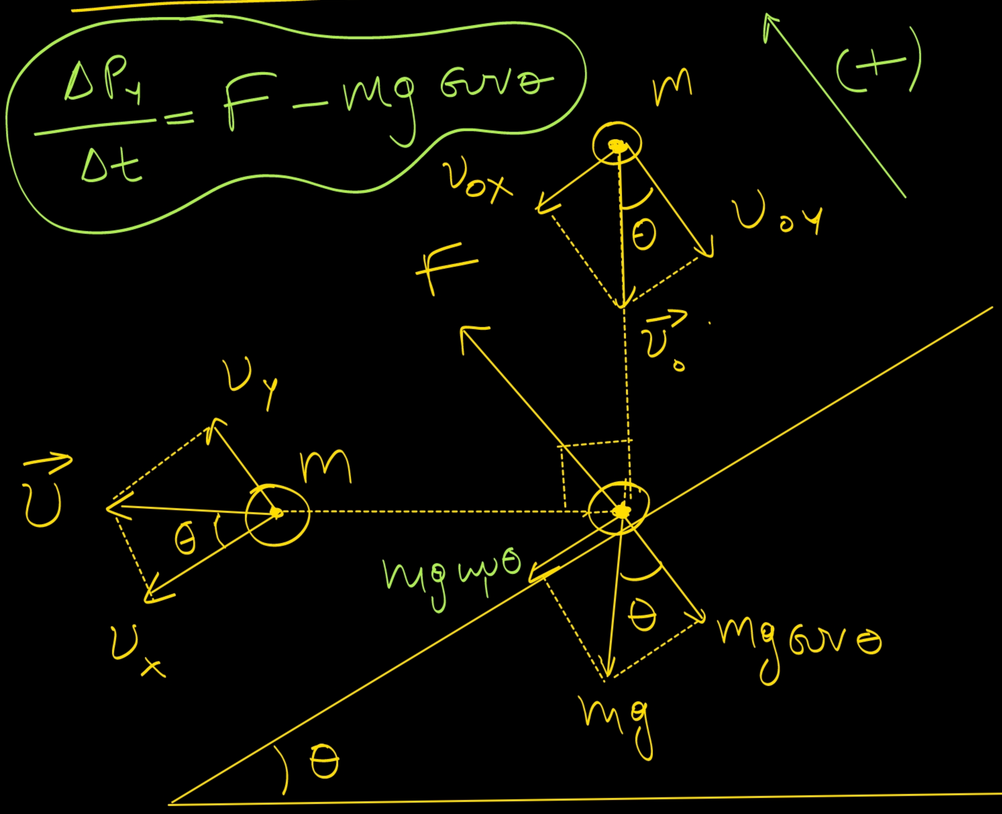
$$\Sigma \vec{F} = \frac{\Delta \vec{p}}{\Delta t}$$

Ασκ. 3.58) (Σκβ6)

$$\frac{\Delta p_y}{\Delta t} = F - mg\sigma\upsilon\nu\theta$$



α) Η δύναμη $\vec{F}$ είναι κάθετη στο κεκλιμένο, δηλαδή κατά μήκος του άξονα y, οπότε η x-συνιστώσα της ορμής δεν αλλάζει.

$$p_{x,\pi\rho\iota\nu} = p_{x,\mu\varepsilon\tau\acute{\alpha}} \Rightarrow$$

$$m \cdot v_{0x} = m \cdot v_x \Rightarrow$$

$$v_0 \cdot \eta\mu\theta = v \cdot \sigma\upsilon\nu\theta \Rightarrow$$

$$40 \cdot \frac{3}{5} = v \cdot \frac{4}{5} \Rightarrow$$

$$v = 30\ m/s.$$

β) Ποσοστό απώλειας ΚΕ =

$$\frac{\Delta K}{K_{\pi\rho\iota\nu}} \cdot 100 =$$

$$= \frac{K_{\mu\varepsilon\tau\acute{\alpha}} - K_{\pi\rho\iota\nu}}{K_{\pi\rho\iota\nu}} \cdot 100 =$$

$$= \frac{\frac{1}{2}mv^2 - \frac{1}{2}mv_0^2}{\frac{1}{2}mv_0^2} \cdot 100 =$$

$$= \frac{v^2 - v_0^2}{v_0^2} \cdot 100 = \frac{900 - 1600}{1600} \cdot 100 = \frac{-700}{16} = -\frac{350}{8} = -\frac{175}{4}$$

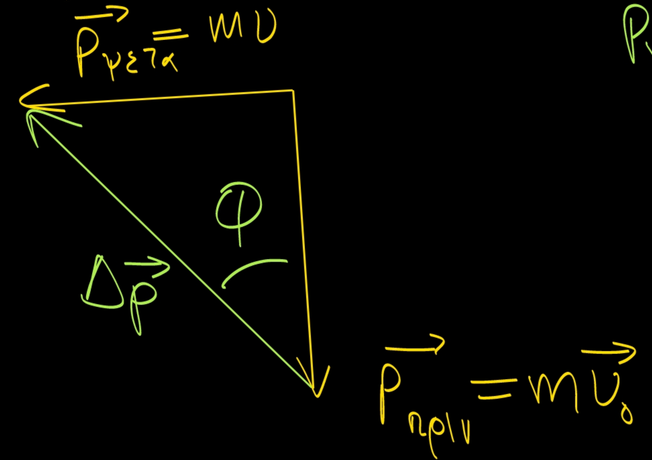
$\frac{\Delta K}{K_{\pi\rho\iota\nu}} \cdot 100 =$ ποσοστιαία μεταβολή ΚΕ

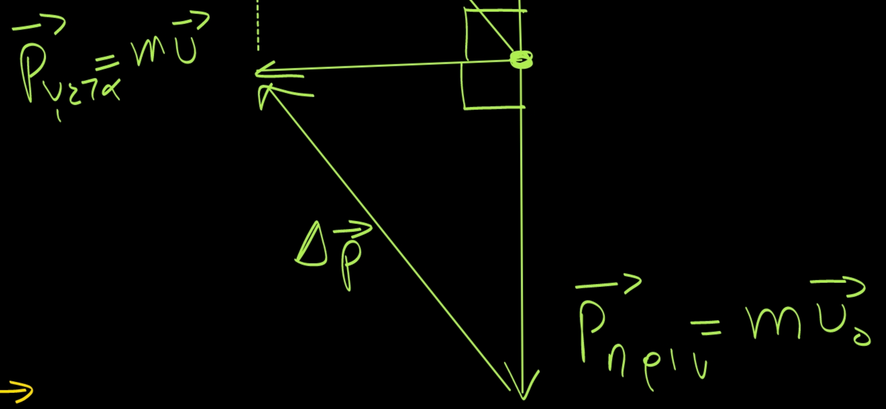
$$-\frac{175}{4} = -\frac{87,5}{2} = -43,75.$$

Άρα η ΚΕ μειώθηκε κατά

$43,75\%$.

$\beta)$





$$\Delta p^2 = (mv)^2 + (mv_0)^2 = 1600 + 900 \Rightarrow$$

$$\Delta p = 50\,kg\cdot m/s.$$

(μέτρο)

$$\Delta p = |\Delta\vec{p}|$$

$$\varepsilon\varphi\varphi = \frac{mv}{mv_0} = \frac{3}{4}$$

(κατείσθυνση)

δ) $\Sigma F_y = \frac{\Delta P_y}{\Delta t} \Rightarrow$

$F - mg\sigma\upsilon\theta = \frac{P_{y,\mu\varepsilon\tau\dot{\alpha}} - P_{y(\pi\rho\iota\nu)}}{\Delta t} \Rightarrow$

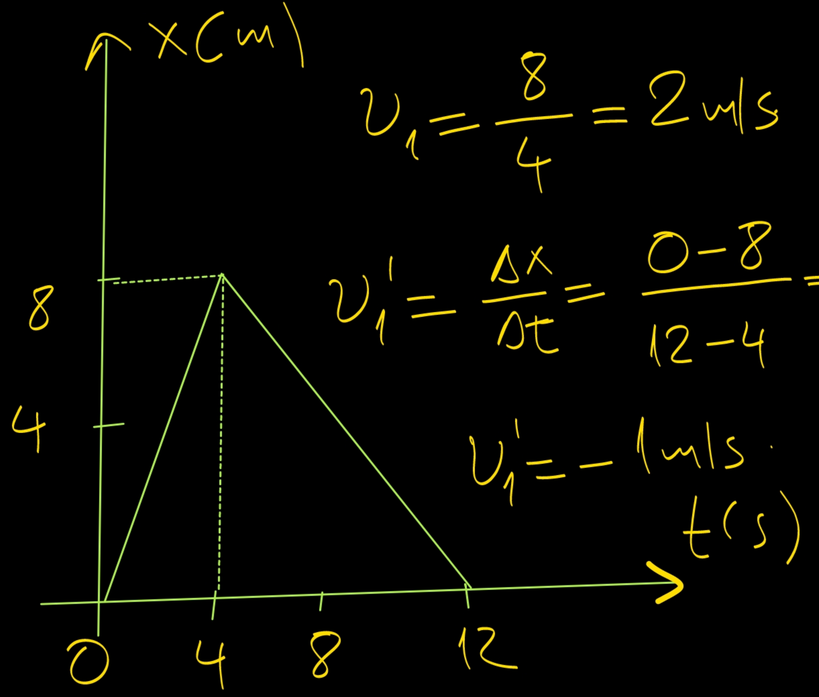
$F - mg\cdot\sigma\upsilon\theta = \frac{m\cdot v_y - (-m\cdot v_{0y})}{\Delta t} \Rightarrow$

$F - mg\sigma\upsilon\theta = \frac{m(v_y + v_{0y})}{\Delta t} \Rightarrow$

$F - mg\sigma\upsilon\theta = \frac{m(v\cdot\eta\mu\theta + v_0\cdot\sigma\upsilon\theta)}{\Delta t} \Rightarrow 508 - 1\cdot 10\cdot\frac{4}{5} = \frac{1\cdot\left(30\cdot\frac{3}{5} + 40\cdot\frac{4}{5}\right)}{\Delta t} \Rightarrow$

$508 - 8 = \frac{\frac{250}{5}}{\Delta t} \Rightarrow 500 = \frac{50}{\Delta t} \Rightarrow \Delta t = 0,1\,sec.$

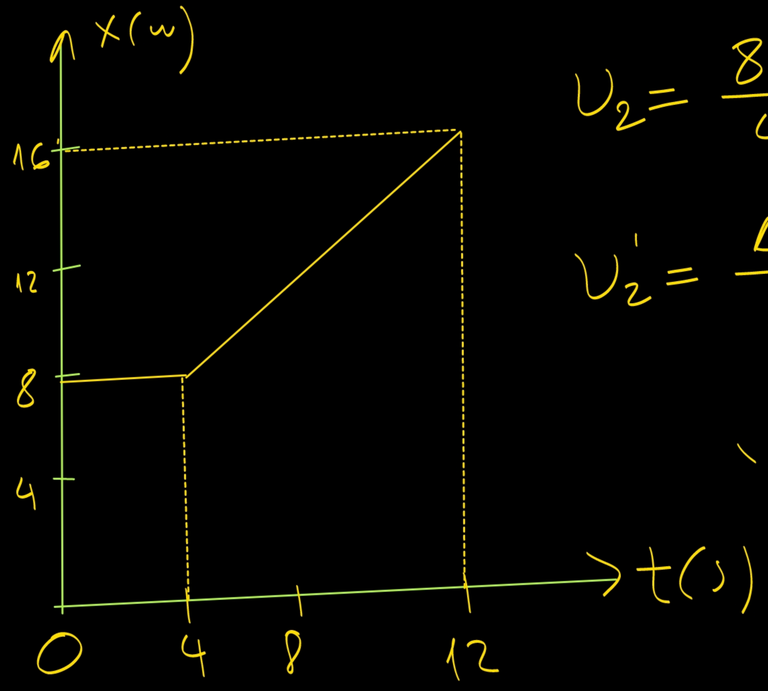
Ασκ. 2.61.



$$v_1 = \frac{8}{4} = 2\ m/s$$

$$v_1' = \frac{\Delta x}{\Delta t} = \frac{0-8}{12-4} \Rightarrow$$

$$v_1' = -1\ m/s$$



$$v_2 = \frac{8-8}{4-0} = 0\ m/s$$

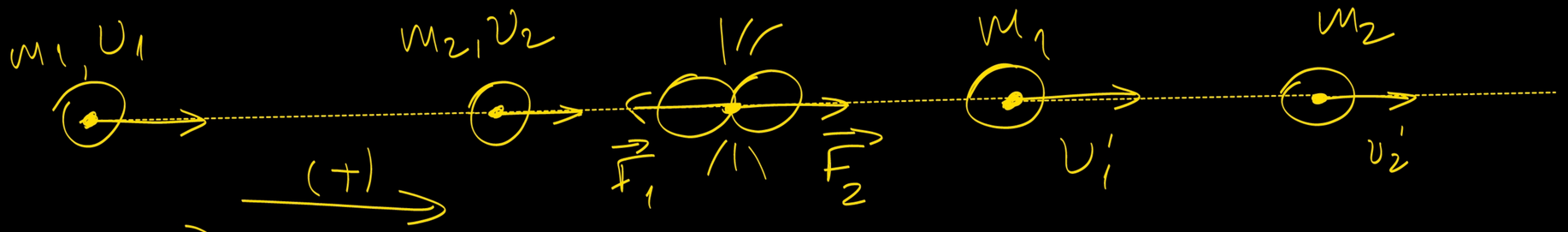
$$v_2' = \frac{\Delta x}{\Delta t} = \frac{16-8}{12-4} = 1\ m/s$$

Άρα: $v_1 + v_1' = 2 - 1 = 1\ m/s$

$v_2 + v_2' = 0 + 1 = 1\ m/s$

Συνεπώς: $v_1 + v_1' = v_2 + v_2'$, οπότε η ορμή είναι ελαστική

$$v_1' - v_2' = -(v_1 - v_2)$$



$(u_1 > u_2)$

$$P_{\pi\rho\iota\nu} = P_{\mu\varepsilon\tau\acute{\alpha}} \Rightarrow m_1 u_1 + m_2 u_2 = m_1 u_1' + m_2 u_2' \quad (1)$$

$$K_{\pi\rho\iota\nu} = K_{\mu\varepsilon\tau\acute{\alpha}} \Rightarrow \frac{1}{2} m_1 u_1^2 + \frac{1}{2} m_2 u_2^2 = \frac{1}{2} m_1 u_1'^2 + \frac{1}{2} m_2 u_2'^2 \quad (2)$$

$$(1) \Rightarrow m_1 u_1 - m_1 u_1' = m_2 u_2' - m_2 u_2 \Rightarrow m_1 (u_1 - u_1') = m_2 (u_2' - u_2) \quad (3)$$

$$(2) \Rightarrow m_1 u_1^2 - m_1 u_1'^2 = m_2 u_2'^2 - m_2 u_2^2 \Rightarrow m_1 (u_1^2 - u_1'^2) = m_2 (u_2'^2 - u_2^2) \Rightarrow$$

$$m_1 (u_1 - u_1')(u_1 + u_1') = m_2 (u_2' - u_2)(u_2' + u_2) \quad (4)$$

Διαιρούμε την (4) με την (3):

$$\frac{(4)}{(3)} \Rightarrow \frac{\cancel{m_1}(v_1-v_1')(v_1+v_1')}{\cancel{m_1}(v_1-v_1')} = \frac{\cancel{m_2}(v_2'-v_2)(v_2'+v_2)}{\cancel{m_2}(v_2'-v_2)} \Rightarrow$$

$$v_1+v_1' = v_2'+v_2 \quad (5)$$

Η (5) γράφεται: $v_1'-v_2' = -v_1+v_2$ (6)

Και η ΑΔΟ: $m_1v_1'+m_2v_2' = m_1v_1+m_2v_2$