

Πα 14.1.2022



2. Test
Τρίτη 18/1/2022

11637/A
 $m=4\text{kg}$, $v_0=5\text{m/s}$, $F=20\text{N}$ ($1/2 v_0$)
 $a=4\text{m/s}^2$
 Δ1) $\Delta x=?$ ($t=0 \dots t_f=5\text{sec}$)
 Δ2) Τρέβει? $T=?$
 Δ3) $v_2=?$ ($\Delta x_2=25\text{m}$) (t_2)
 Δ4) $t_2: F=0 \rightarrow \Delta x_{\text{max}}=?$ ($v=0$)
 ΚΑΤΑΡΤΙΣΤΑΙ Η ΔΥΝΑΜΗ

Δ1) ΕοΕκ $t \in v_0$
 $\Delta x = v_0 t + \frac{1}{2} a t^2 = 5 \cdot 5 + \frac{1}{2} \cdot 4 \cdot 5^2 = 25 + 2 \cdot 25 = 25 + 50 \Rightarrow \Delta x = 75\text{m}$

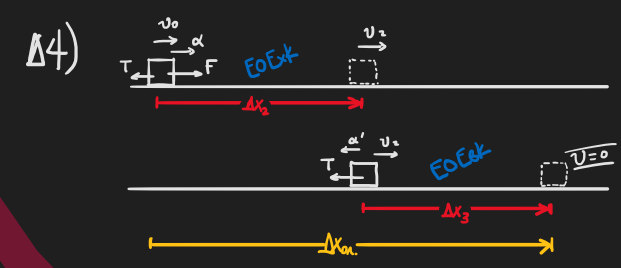
Δ2) $\text{χωρίς ύλη υπάρχει τριβή (και δύναμη)}$
 $F = m a \Rightarrow 20 = 4 \cdot a \Rightarrow 20 = 16$ (παράδοξο)
 ΠΡΟΣΟΧΗ! Δεδομένη ο τύπος $F = m a$
 υπάρχει μόνο ο τύπος:
 $\Sigma F = m \cdot a$

$\Sigma F = m a \Rightarrow F - T = m a \Rightarrow 20 - T = 4 \cdot 4 \Rightarrow 20 - T = 16 \Rightarrow 20 - 16 = T \Rightarrow T = 4\text{N}$

Δ3) $\Delta x_2 = 25\text{m} \rightarrow \Delta x_2 = v_0 t_2 + \frac{1}{2} a t_2^2 \Rightarrow 25 = 5 t_2 + \frac{1}{2} \cdot 4 t_2^2 \Rightarrow 25 = 5 t_2 + 2 t_2^2 - 25 \Rightarrow 2 t_2^2 + 5 t_2 - 25 = 0$

$\Delta = b^2 - 4 a \gamma = 5^2 - 4 \cdot 2 \cdot (-25) = 25 + 200 = 225$
 $t_2 = \frac{-b \pm \sqrt{\Delta}}{2 a} = \frac{-5 \pm \sqrt{225}}{2 \cdot 2} = \frac{-5 \pm 15}{4}$
 $t_2 = \frac{-5+15}{4} = \frac{10}{4} = 2.5\text{sec}$
 $t_2 = \frac{-5-15}{4} = -\frac{20}{4} = -5$ (απορριπτό)

$v_2 = v_0 + a \cdot t_2 = 5 + 4 \cdot 2.5 = 5 + 10 \Rightarrow v_2 = 15\text{m/s}$

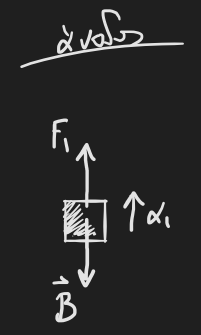


$\alpha' = \frac{\Sigma F}{m} = \frac{T}{m} = \frac{4}{4} \Rightarrow \alpha' = 1\text{m/s}^2$
 πρώτα προς εμπρός ύστερα προς δεξιά

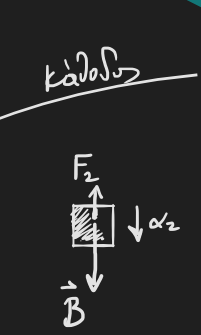
$\Delta x_{\text{max}} = \frac{v_0^2}{2|\alpha|} \rightarrow \Delta x_3 = \frac{v_2^2}{2 \cdot \alpha'} = \frac{15^2}{2 \cdot 1} = \frac{225}{2} = 112.5\text{m}$

$\Delta x_{\text{ολ}} = \Delta x_2 + \Delta x_3 = 25 + 112.5 \Rightarrow \Delta x_{\text{ολ}} = 137.5\text{m}$

8030/B2 !!
 (8031/B2)
 Άνδρας: $F_1, \alpha_1 = g/2$
 Κάλυδο: $F_2, \alpha_2 = g/2$
 Α. $F_1 = F_2$
 Β. $F_1 = 3 F_2$
 Γ. $F_1 = 2 F_2$
 (8032/B1)



$\Sigma F = m a$
 $F_1 - B = m a_1$
 $F_1 - m g = m \frac{g}{2}$
 $F_1 = m g + m \frac{g}{2}$
 $F_1 = \frac{3}{2} m g$



$\Sigma F = m a$
 $B - F_2 = m a_2$
 $m g - F_2 = m \frac{g}{2}$
 $m g - m \frac{g}{2} = F_2$
 $\frac{m g}{2} = F_2$

$F_1 = \frac{3}{2} m g = 3 F_2 \Rightarrow F_1 = 3 F_2$
 Β.

8026/B1
 Διάγραμμα F vs t για ένα σώμα.

$E \circ E_K$
 $\alpha = 6\text{rad/s}^2$ (αριθμητική)
 $\Sigma F = m a = \text{αριθμ.}$
 $F = m a = \text{αριθμ.}$

Πο ΤΥΠΟΣ ΤΡΟΠΟΣ
 $x = v_2 - \alpha' t_3 \Rightarrow 0 = 15 - 1 \cdot t_3 \Rightarrow t_3 = 15\text{sec}$
 $\Delta x_3 = v_2 t_3 - \frac{1}{2} \alpha' t_3^2 = 15 \cdot 15 - \frac{1}{2} \cdot 1 \cdot 15^2 = 225 - \frac{1}{2} \cdot 225 = 225 - 112.5 \Rightarrow \Delta x_3 = 112.5\text{m}$