Θέμα.

A_1 α

A_2 β

A_3 δ

A_5

α → Λ

Β → Σ.

γ → Σ.

δ → Λ

Ε → Λ.

B1

$m_1 = m$.

v_0.

$m_2 = 3m$.

$P_{\text{πριν}} = P_{\text{μετα}}$.

$$m_1 v_0 = (m_1 + m_2) v$$

$$m v_0 = 4 m v$$

$$v = \frac{v_0}{4}$$

$$K_1 = \frac{1}{2} m_1 v_0^2$$

$$K_2 = \frac{1}{2} (m_1 + m_2) v^2$$

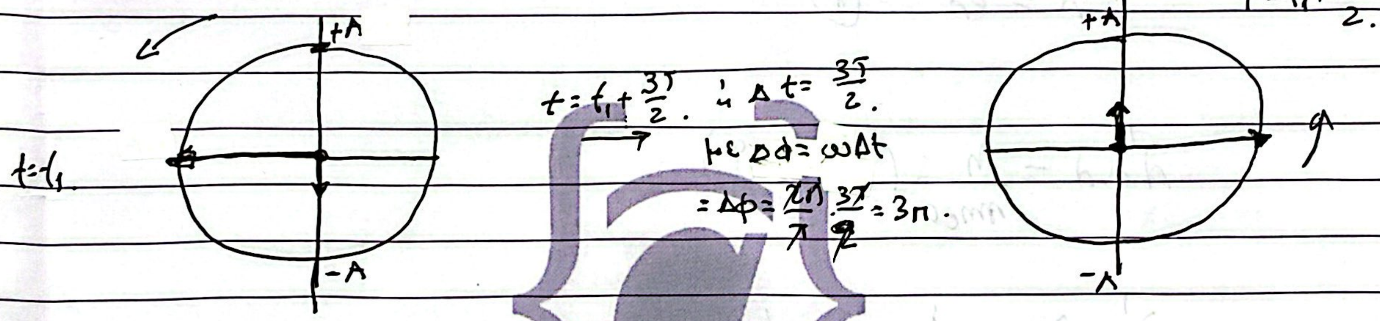
$$\frac{K_1}{K_2} = \frac{\frac{1}{2} m v_0^2}{\frac{1}{2} 4m v^2} = \frac{1}{4} \frac{v_0^2}{\frac{v_0^2}{16}} = 4$$

$$\boxed{\frac{K_2}{K_1} = \frac{1}{4}}$$

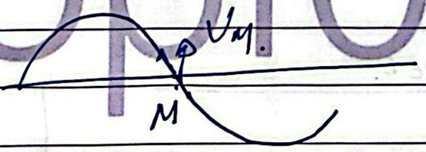
B2

Το κύμα διαδίδεται προς τα δεξιά.

άρα α μετά από $t = \frac{3T}{2}$.



Το στιγμιότυπο θα είναι.



B_3

$$E = E' + K_e$$
$$E = E' + E'$$
$$E = 2E'$$
$$\frac{hc}{\lambda} = 2\frac{hc}{\lambda'}$$

$$\lambda' = 2\lambda \quad (1)$$

$$\lambda' - \lambda = \frac{h}{m_e c}(1 - \sigma\upsilon\nu\varphi^\circ)$$

$$\lambda' - \lambda = \frac{h}{m_e c}\left(1 - \frac{1}{2}\right)$$
$$\lambda' - \lambda = \frac{h}{2m_e c} \quad (2) \quad (1)$$

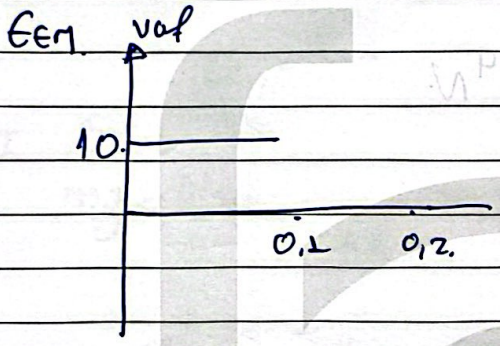
$$2\lambda - \lambda = \frac{h}{2m_e c}$$
$$\lambda = \frac{h}{2m_e c}$$

$E = K_e + E_0 \Rightarrow E = \frac{hc}{\lambda} + 2m_e c^2$

Θέμα Γ

Γ1 $\frac{\Delta B}{\Delta t} = \frac{0,5-0}{0,1-0} = 5 T/s$

$|\mathcal{E}_{επ}| = N \frac{\Delta \Phi}{\Delta t} = N \frac{\Delta B}{\Delta t} \cdot A = 10$ volt.



Από $t=0,1$ sec. έως $t=9,2$ sec $\mathcal{E}_{επ}=0$.

Γ2 $V = N\omega BA = 50\pi$ volt.

$Q = \frac{V_{ενεργ}^2}{R} \Delta t = \frac{V^2}{2R} \Delta t. = 5\pi^2$ Joule. $= 50$ Joule

Γ3 $\omega' = 2\omega$

$V' = 100\pi$ volt. $\quad T' = \frac{1}{50}$ sec.

$Q' = \frac{V^2}{2R} \Delta t' = 100\pi$

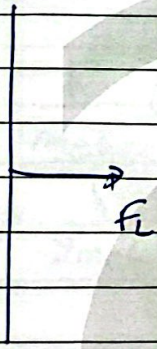
$\eta = \frac{\Delta Q}{Q} = 100\%$.

Γ4.

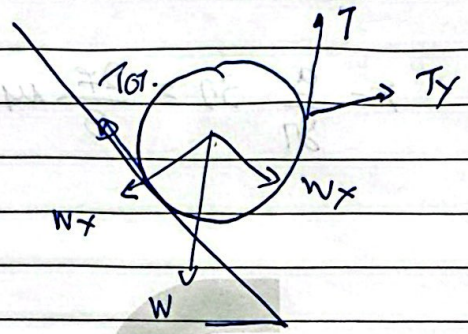
$$B_{xy} = \frac{\mu_0}{2\pi}\frac{I}{d} = 5\,10^{-5}\,T$$

$$I = \frac{E}{R} = 2A$$

$$F_L = B_{xy}\, I\, \ell = 10^{-4}\,N$$



Θέμα 2



$\Sigma f_x = 0$

$W_x = T_{ολ} + T_v \eta\mu\vartheta$

$\Sigma \tau = 0.$ $\quad T_v R - T_{ολ} R = 0$

$T_v = T_{ολ}$

$T_v = 15N.$

$\Sigma f = 0$ $\quad F_{ελ} = \alpha m g + T$

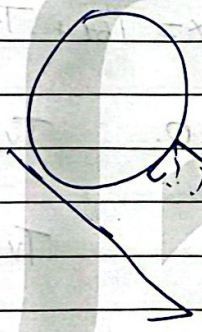
$K \Delta\ell = 15 + 15$

$\Delta \ell = 0,5 m.$

Για δεύτερη φορά έχω διαφορά. $\theta = 3\pi$.

$$x = R\theta \Rightarrow x = \frac{9}{8\pi} 3\pi = \frac{27}{8} \mu.$$

β).



$$v = v_{cm}\sqrt{2}.$$

$$x = \frac{1}{2} a_{cm} t^2 \Big\} a_{cm} = 3\,m/s^2$$

$$x = \frac{27}{8} m$$

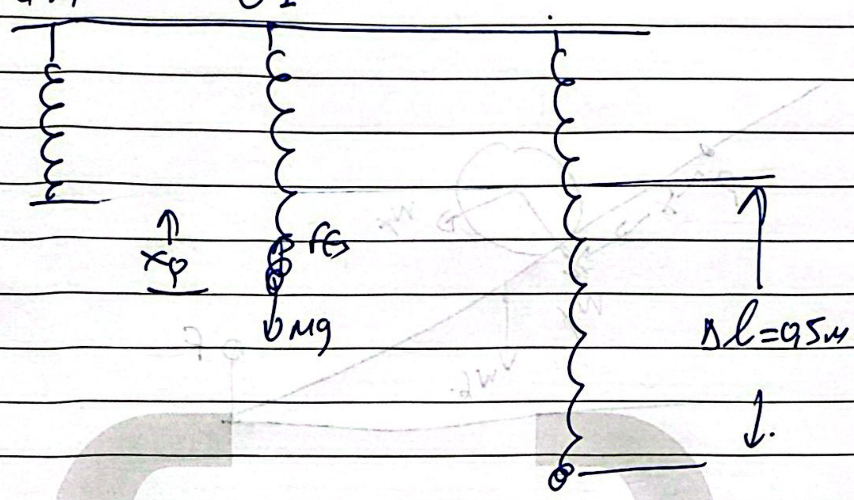
$$v_{cm} = a_{cm} t$$

$$v_{cm} = 4{,}5\ m/s$$

$$v = v_{cm} \cdot \sqrt{2}$$

$$v = 4{,}5\sqrt{2}\ m/s.$$

Δ3



ΘΙ $\Sigma F = 0$

$mg = k x_0$

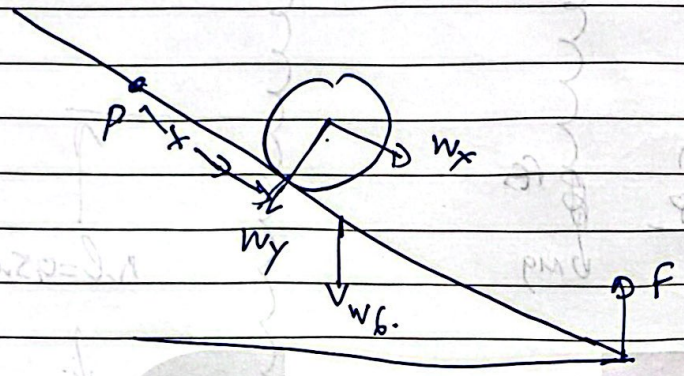
$x_0 = 0{,}25m.$

$T = 2\pi\sqrt{\frac{m_1}{k}} = 2\pi\sqrt{\frac{1}{40}} = \frac{2\pi}{\sqrt{40}} = \frac{2\pi}{2\pi} = 1sec.$

$A = 0{,}5m$

Αφού βρίσκεται στην πάνω ακραία θέση που ταυτίζεται με το φυσικό μήκος

$W_{F_{ελ}} = U_{αρχ} - U_{τελ} = \frac{1}{2} k \Delta l^2 = 5{,}5J$



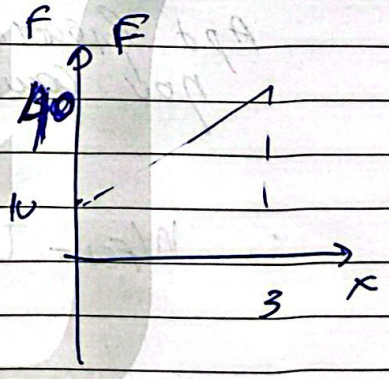
$\tau_F = F \cdot l \cdot \eta\mu\vartheta$

$\tau_w = -W(0{,}5+x)\,\eta\mu\vartheta$

$\tau = -m\delta \cdot g \frac{l}{2}\,\eta\mu\vartheta$

$\Sigma T = 0$

$Fl - 40(0{,}5+x) - 20 = 0$



$F = 10 + 10x$

$0 \le x \le 3$