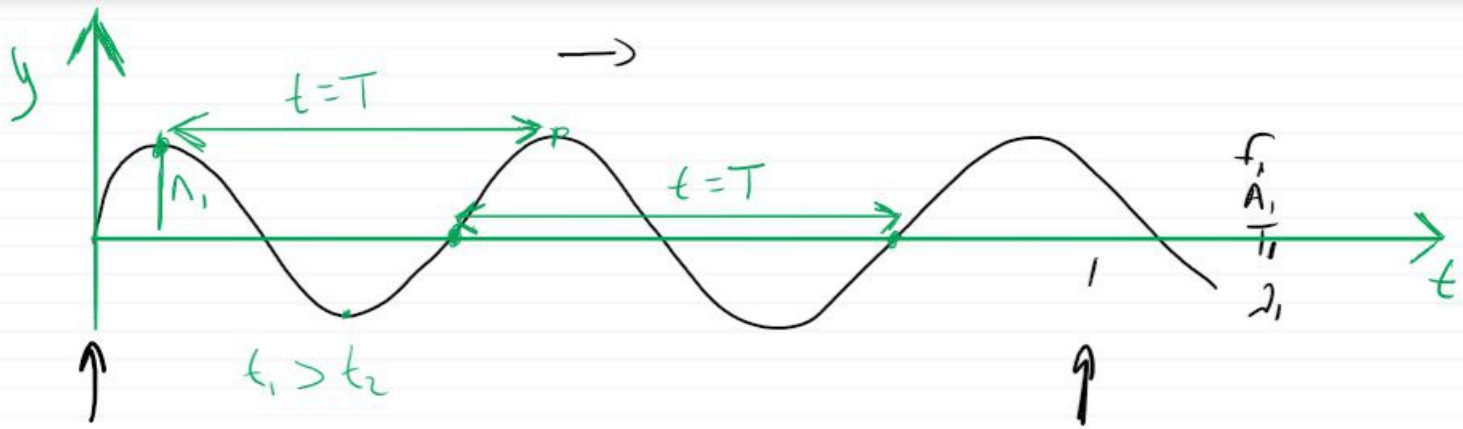
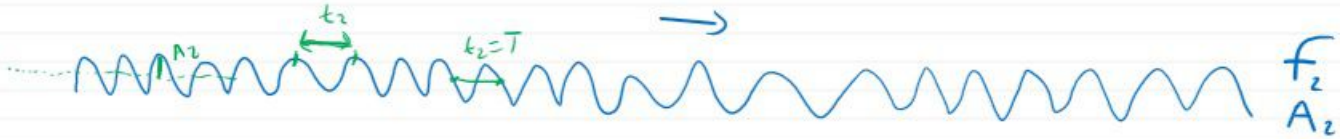




T ; $\rightsquigarrow$ $t \rightarrow$ 1 επανάληψη

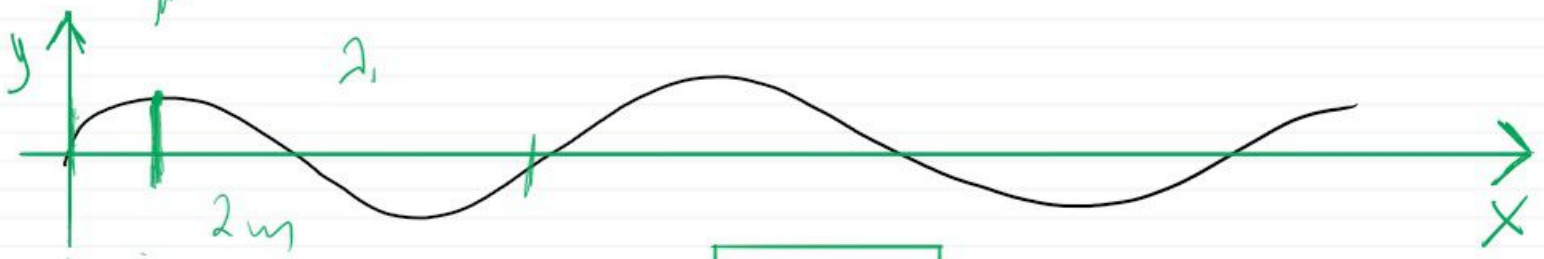
f ; $\rightsquigarrow$ πόσες επαναλήψεις κάθε 1 sec

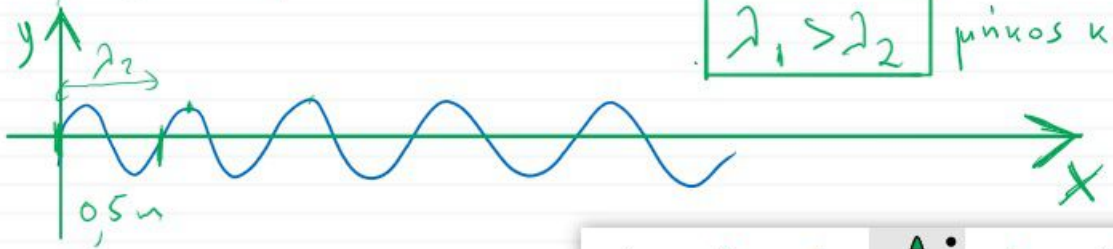
$T_1 > T_2$
$f_1 < f_2$
$T = \frac{1}{f}$

$A_1 > A_2$

$T_1 > T_2 \Rightarrow \frac{1}{f_1} > \frac{1}{f_2} \Rightarrow f_2 > f_1$

$v = \lambda \cdot f$





$\lambda_1 > \lambda_2$ μήκος κύματος

Άσκηση 1

Εγκ. κύμα

→ $t \rightsquigarrow y_r = A$

→ x

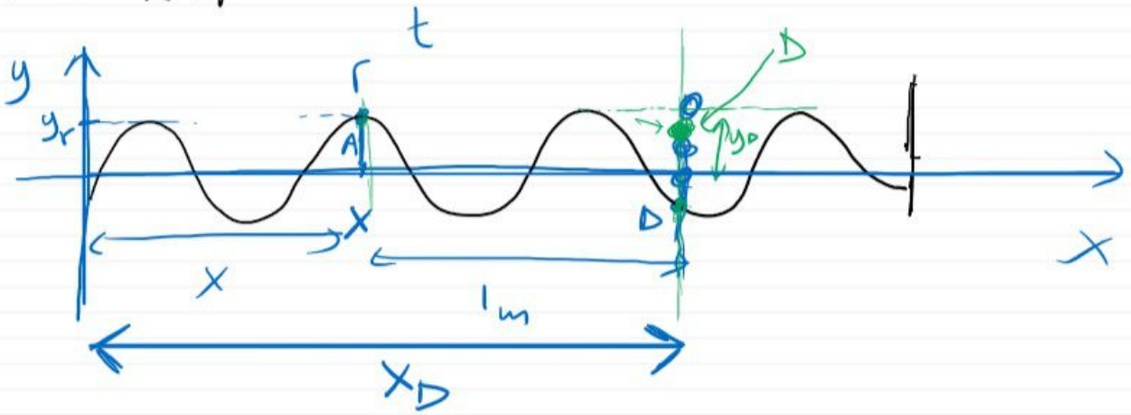
$A = 3m$

$k = 2/s$

$\omega = 1/s$

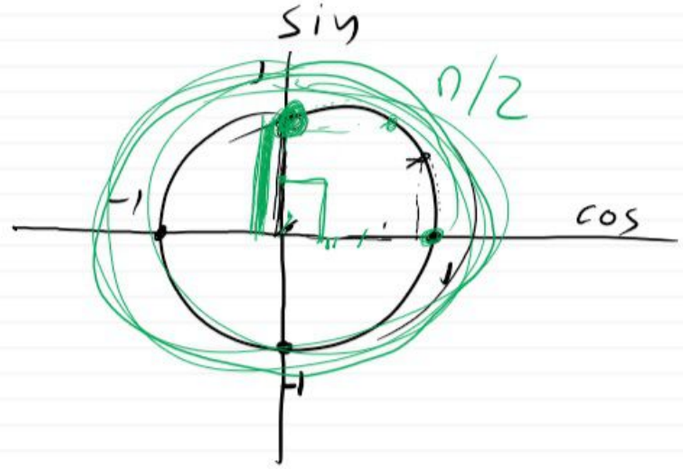
$y_D \rightsquigarrow$ 1m δεξιά Γ

$t \rightsquigarrow$ 1 sec αργότερα



90 → π/2

450 → π/2 + 2π



Λύση

γωνία

$y_r = A \underbrace{\sin(kx_r - \omega t)}_{1}$

$y_r = A$

$\sin(kx_r - \omega t) = 1 \rightsquigarrow \boxed{kx_r - \omega t = \frac{\pi}{2} + 2\pi \cdot v}$, $v = 0, \pm 1, \pm 2 \dots$

φ_D

$y_D = A \sin(kx_D - \omega t')$

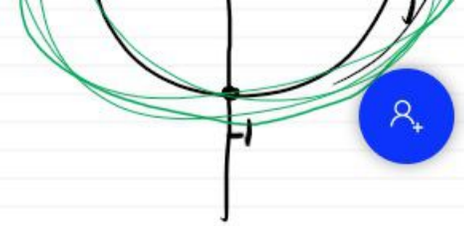
$x_D = x_r + 1$

$t' = t + 1$

$\varphi_D = kx_D - \omega t' = k(x_r + 1) - \omega(t + 1) =$

$= kx_r + k - \omega t - \omega = kx_r - \omega t + k - \omega =$

Λύση



γενικά

$$y_r = A\sin(kx_r - \omega t)$$

$$y_r = A \cdot 1$$

$$\sin(kx_r - \omega t) = 1 \rightsquigarrow \boxed{kx_r - \omega t = \frac{\pi}{2} + 2\pi\nu}, \quad \nu = 0, \pm 1, \pm 2 \dots$$

φ_D

$$y_D = A\sin(kx_D - \omega t')$$

$$x_D = x_r + 1$$

$$t' = t + 1$$

$$\varphi_D = kx_D - \omega t' = k(x_r + 1) - \omega(t + 1) =$$

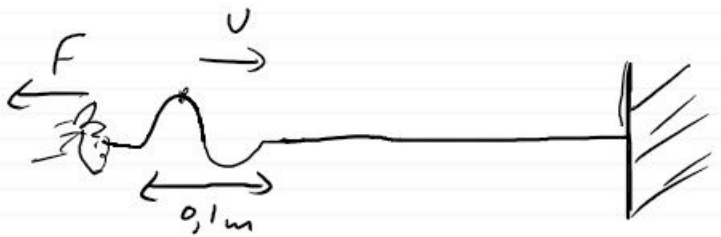
$$= kx_r + k - \omega t - \omega = kx_r - \omega t + k - \omega =$$

$$= \frac{\pi}{2} + 2\pi\nu + \frac{2}{5} - \frac{1}{5} = \frac{\pi}{2} + 2\pi\nu + \frac{1}{5}$$

$$y_D = A\sin\left(\frac{\pi}{2} + 2\pi\nu + \frac{1}{5}\right) = A\sin\left(\frac{\pi}{2} + \frac{1}{5}\right) = A\cos\left(\frac{1}{5}\right) \Rightarrow$$

$$\Rightarrow y_D = 3 \cdot 0{,}98 \Rightarrow \boxed{y_D = 2{,}94\ m}$$

Άσκηση 2



$m = 500gr$

$L = \text{μήκος} = 50cm$

$F = 80N$

$\lambda = 0,1m$

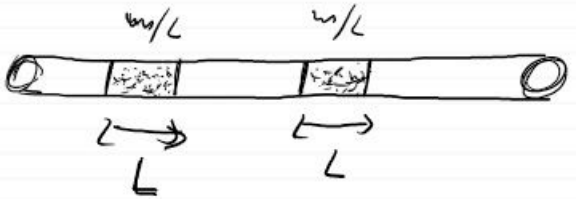
$\upsilon = ;$

$f = ;$

$$\upsilon = \sqrt{\frac{F}{\mu}} \quad \mu \rightarrow \text{γραμμική πυκνότητα}$$

$$\mu = \frac{m}{L} \rightarrow \text{μήκος}$$

$$\rho = \frac{m}{V}$$



$$\upsilon = \sqrt{\frac{F}{\mu}} = \sqrt{\frac{F}{\frac{m}{L}}} = \sqrt{\frac{80N}{\frac{0,5kg}{0,5m}}} = \sqrt{80}\ m/s = 8,94\ m/s$$

$$\upsilon = \lambda \cdot f \Rightarrow f = \frac{\upsilon}{\lambda} = \frac{8,94\ m/s}{0,1\ m} = 89,4\ Hz$$

Άσκηση 3

Χορδή $L = 2m$

υπό τάση $20\,N$

$t = 50\,ms$ διάρκεια διάδοσης

$m = ;$

milli $\to 10^{-3}$

ms $\to 10^{-3}\,s$

$50\,ms \to 50 \cdot 10^{-3}\,s = 0{,}05\,sec$

$\mu \to 10^{-6}$

$$\left.\begin{array}{l} v = \sqrt{\dfrac{F}{\mu}} \\ \mu = \dfrac{m}{L} \end{array}\right\} v = \sqrt{\frac{F}{\frac{m}{L}}} \Rightarrow$$

$$\Rightarrow v^2 = \frac{F}{m/L} \Rightarrow v^2 = \frac{F \cdot L}{m} \Rightarrow$$

$$\left.\begin{array}{l} \Rightarrow m = \dfrac{F \cdot L}{v^2} \\ v = \dfrac{L}{t} \end{array}\right\} m = \frac{F \cdot \cancel{L}}{\cancel{L^2}/t^2} = \frac{F \cdot t^2}{L} =$$

$$= \frac{\overset{10}{\cancel{20}}N \cdot 0{,}05^2\,sec^2}{\cancel{2}m} = 0{,}025\,kg \Rightarrow \boxed{m = 0{,}025\,kg}$$

25 gr

Άσκηση 4

Ένταση ηλίου $1200\ W/m^2$ | ηλιακή ισχύς

Χωράφι → $30 \times 40\ m$ | Ενέργεια → 1 μήνα

Ένταση : I $\rightsquigarrow$ $I = \dfrac{P \to \text{ισχύς}}{S \to \text{επιφάνεια}}$ $\Rightarrow P = I \cdot S = 1200\ W/\cancel{m^2} \cdot 30 \cdot 40\ \cancel{m^2} =$

$= 1200 \cdot 1200\ W = 1440000\ W$

$P = \dfrac{\epsilon}{t} \Rightarrow \epsilon = P \cdot t = 144 \cdot 10^4\ W \cdot 30 \cdot 24 \cdot 60 \cdot 60\ sec = 3{,}72 \cdot 10^{12}\ J$