

Η.Π. : ΠΡΟΠΟΝΗΣΗ

1α, β: $t=0, x=+\frac{A\sqrt{2}}{2}, v>0 \leadsto v<0$

2α, β: $t=0, x=+\frac{A\sqrt{3}}{2}, v>0 \leadsto v<0$

$t=0, x=+\frac{A}{2}, v>0$

$x=A \cdot \cos(\omega t + \phi_0)$

$\frac{A}{2} = A \cdot \cos(\omega \cdot 0 + \phi_0)$

$\frac{1}{2} = \cos \phi_0$

$\phi_0 = \pm \frac{\pi}{3}$

$\phi_0 = 2k\pi + \frac{\pi}{3} \Rightarrow \phi_0 = \frac{\pi}{3} \text{ r.a.d.}$

$\phi_0 = 2k\pi + 2\pi - \frac{\pi}{3} \Rightarrow \phi_0 = \frac{5\pi}{3} \text{ r.a.d.}$

$v = v_{max} \cdot \sin(\omega t + \phi_0)$

$t=0$

$v = v_{max} \cdot \sin \phi_0$

$\phi_0 = \frac{\pi}{3}$

$v = v_{max} \cdot \sin \frac{\pi}{3} > 0$

$\phi_0 = \frac{5\pi}{3}$

$v = v_{max} \cdot \sin \frac{5\pi}{3} < 0$

$\phi_0 = \frac{\pi}{3} \text{ r.a.d.}$

$\sin \frac{5\pi}{3} = \sin(\pi - \frac{\pi}{3}) = -\sin \frac{\pi}{3} = -\frac{\sqrt{3}}{2}$

$x = A \cdot \cos(\omega t + \frac{\pi}{3})$

$v = \omega A \cdot \sin(\omega t + \frac{\pi}{3})$

$a = -\omega^2 A \cdot \cos(\omega t + \frac{\pi}{3})$

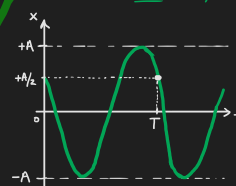
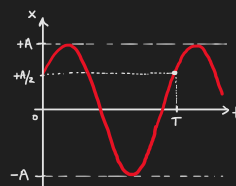
$x = A \cdot \cos(\omega t + \frac{\pi}{3})$

$t=0: x = A \cdot \cos(\omega \cdot 0 + \frac{\pi}{3}) = A \cdot \cos \frac{\pi}{3} = A \cdot \frac{1}{2} = \frac{A}{2}$

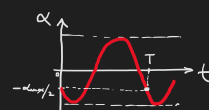
$\rightarrow v = \omega A \cdot \sin(\omega t + \frac{\pi}{3})$

$t=0: v = \omega A \cdot \sin(\omega \cdot 0 + \frac{\pi}{3}) = \omega A \cdot \sin \frac{\pi}{3} = \omega A \frac{\sqrt{3}}{2} > 0$

$t=0$
 $x=+\frac{A}{2}$
 $v>0$
 $\rightarrow \phi_0 = \frac{\pi}{3}$



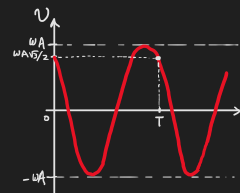
$a = -\omega^2 A \cdot \cos(\omega t + \frac{\pi}{3}) = -\omega^2 x \rightarrow$ ω $\rightarrow$ $\phi_0 = \frac{\pi}{3}$ $\rightarrow$ $\phi_0 = \frac{5\pi}{3}$



$v = \omega A \sin(\omega t + \frac{\pi}{3}) \rightarrow t=0 \Rightarrow v = \omega A \frac{\sqrt{3}}{2}$

$\frac{dv}{dt} = a = -\omega^2 A \cdot \cos(\omega t + \frac{\pi}{3}) \xrightarrow{t=0} a = -\omega^2 A \frac{1}{2} < 0$

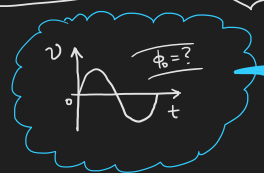
$t=0$
 $v = \omega A \frac{\sqrt{3}}{2}$
 $a = \frac{dv}{dt} < 0$



$\frac{1}{2} = 0.5$
 $\frac{\sqrt{3}}{2} = 0.866$
 $\frac{1}{2} = 0.5$
 $\frac{\sqrt{3}}{2} = 0.866$

Υπολογισμός Αρχ. Φάσης από Γραφική Παράσταση:

ΑΔΟΛΕΙΟ: Γραφική $\rightarrow$ Συνάρτηση: ϕ_0



• Γνωρίζω ότι: $v = v_{max} \cdot \sin(\omega t + \phi_0)$
• Βλέπω ότι: $v = v_{max} \cdot \sin \omega t$

$v_{max} \cdot \sin(\omega t + \phi_0) = v_{max} \cdot \sin \omega t \Rightarrow$
 $\sin(\omega t + \phi_0) = \sin \omega t \xrightarrow{*} \phi_0 = 0 \text{ rad}$

*: $\sin \alpha = \sin \beta \Rightarrow \alpha = \beta$ ή $\alpha = \pi - \beta$
 $\sin(\omega t + \frac{\pi}{2}) = \sin \omega t$ $\times$
 $\sin(\omega t + \frac{3\pi}{2}) = -\sin \omega t$ $\times$
 $\sin(\omega t + \frac{\pi}{6}) = \sin \omega t$ $\checkmark$