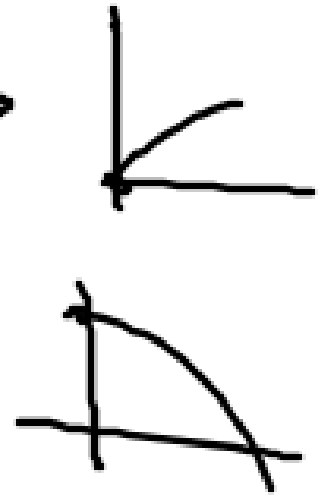
$$x = A \cdot \text{sen}(\omega t + \varphi_0)$$

$$x = A \cdot \cos(\omega t + \varphi_0)$$

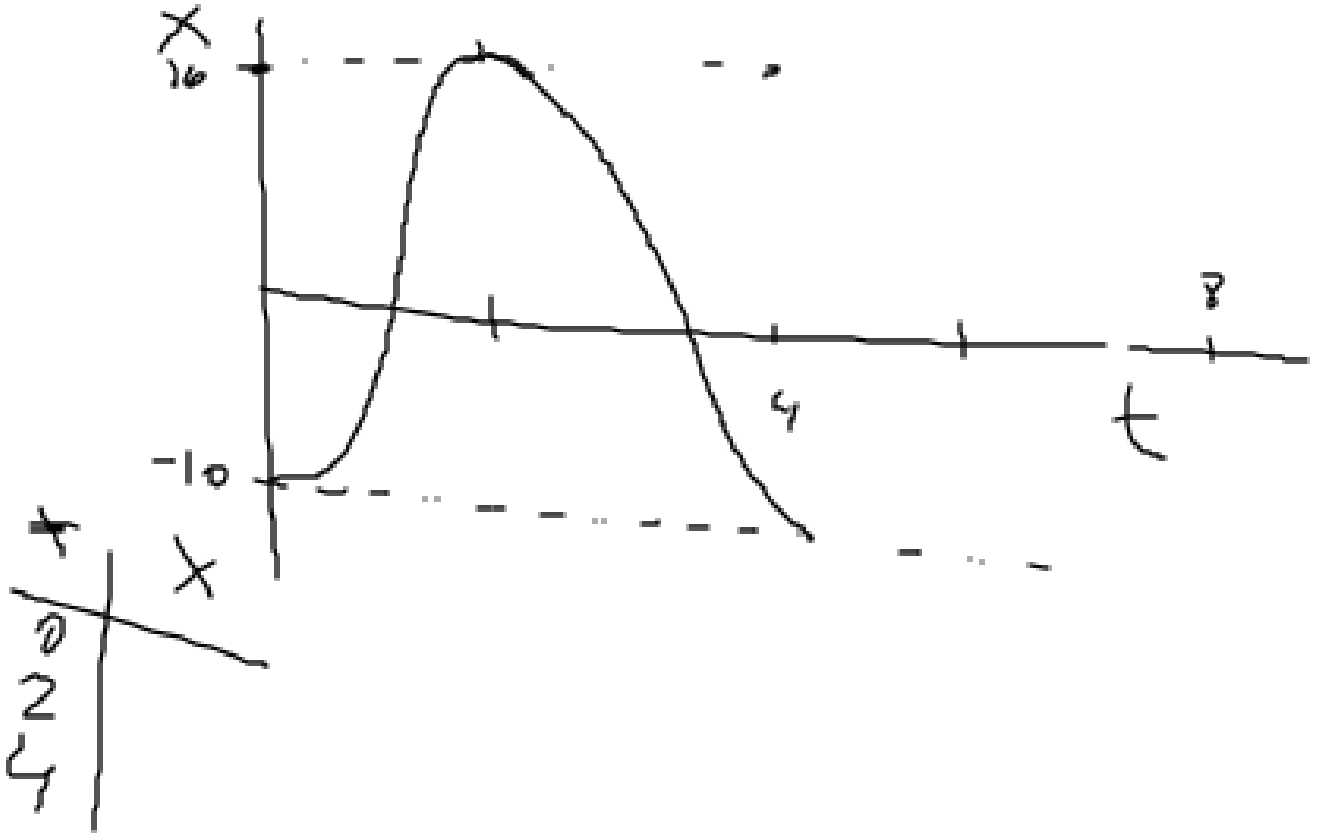


10] $x = 10 \cdot \cos\left(\frac{\pi}{2}t + \pi\right)$ * $x = 0'1 \cdot \cos\left(\frac{\pi}{2}t + \pi\right)$ → en m.

a) $A = 10\,cm = 0'1\,m$

$\omega = \frac{2\pi}{T}$ $\quad T = \frac{2\pi}{\omega} = \frac{2\pi}{\frac{\pi}{2}} = 4\,s$

$f = \frac{1}{T} = \frac{1}{4} = 0'25\,Hz$


x
16
-10
4
8
t
x
t
0
2
4

Velocidad y aceleración

$V = x'$

$a = v'$

$$x = A \cdot \operatorname{sen}(\omega t + \varphi_0)$$

$$V = x' = A \cdot \cos(\omega t + \varphi_0) \cdot \omega$$

$$V = A \cdot \omega \cdot \cos(\omega t + \varphi_0)$$

$$V_{max} = A \cdot \omega$$

$a = v' = A\omega \cdot -\operatorname{sen}(\omega t + \varphi_0) \cdot \omega$

$v = A \cdot \omega \cdot \cos(\omega t + \varphi_0)$

$$a = -A \cdot \omega^2 \cdot \operatorname{sen}(\omega t + \varphi_0)$$

$$a = -\omega^2 x$$ → very important

x	$A \cdot \operatorname{sen}(\omega t + \varphi_0)$	$A \cdot \cos(\omega t + \varphi_0)$	
v	$A\omega \cdot \cos(\omega t + \varphi_0)$	$-A\omega \cdot \operatorname{sen}(\omega t + \varphi_0)$	$v_{max} = A \cdot \omega$
a	$-A\omega^2 \cdot \operatorname{sen}(\omega t + \varphi_0)$	$-A \cdot \omega^2 \cdot \cos(\omega t + \varphi_0)$	$\rightarrow -\omega^2 \cdot x$

Dinámica del m.a.s

Al ser un muelle, $F_H = k \cdot x$

$F = m \cdot a = -m \cdot \omega^2 \cdot x$

$a = -\omega^2 \cdot x$

$F = F_H \rightarrow -m \cdot \omega^2 \cdot x = k \cdot x \rightarrow$

$$k = -m \cdot \omega^2$$

$K = m \cdot \omega^2 \rightarrow \frac{K}{m} = \omega^2 \rightarrow \boxed{\omega = \sqrt{\frac{K}{m}}}$

$\boxed{T = 2\pi\sqrt{\frac{m}{K}}}$

$\frac{2\pi}{T} = \sqrt{\frac{K}{m}} \rightarrow \frac{T}{2\pi} = \sqrt{\frac{m}{K}}$

$\boxed{T = 2\pi\sqrt{\frac{m}{K}}}$

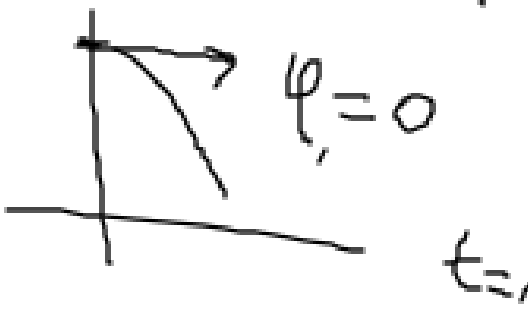
8) $f = 2 \cdot 10^4 \text{ Hz}$, $A = 6'5 \cdot 10^{-3} \text{ cm}$

$6 \rightarrow x = 2'6 \cdot 10^{-3} \text{ cm}$

$x = A \cdot \cos(\omega t + \varphi_0) = 6'5 \cdot 10^{-3} \cdot \cos(4\pi \cdot 10^4 t + \varphi_0)$

$\omega = 2\pi \cdot f = 2\pi \, 2 \cdot 10^4 = 4\pi \cdot 10^4 \text{ rad/s}$

Valor máximo, empieza es decir en $t=0$, $x=\Delta$



$A = A \cdot \cos(\omega \cdot t + \varphi_0)$ ($\omega \cdot t \to 0$) $\to 1 = \cos \varphi_0 \to$

$\cos^{-1} 1 = \varphi_0 \to$ [Shift] [cos] [1] $\to \varphi_i = 0$

$t \rightarrow x = 2'6 \cdot 10^{-3}$

$x = A \cdot \operatorname{sen}(\omega t + \varphi_0)$

$-2'6 \cdot 10^{-3} = 6'5 \cdot 10^{-3} \cdot \cos(4\pi \cdot 10^4 \cdot t)$

$\frac{-2'6 \cdot 10^{-3}}{6'5 \cdot 10^{-3}} = \cos(4\pi \cdot 10^4 t)$

$-0'4 = \cos(4\pi \cdot 10^4 t) \rightarrow \cos^{-1}(0'4) = 4\pi \cdot 10^4 t$

$$1'96 = 4\pi \cdot 10^4 \, t$$

$$\frac{1'96}{4\pi \cdot 10^4} = t \rightarrow \boxed{t = 1'2 \cdot 10^{-5} \, s}$$

$$x = 3 \cdot \operatorname{sen}\left(\frac{\pi}{2} t + \pi\right)$$

b) Cuánto tiempo tarda en llegar a una elongación de $x = 2$

c) ¿Qué elongación tendrá a los 10 s?