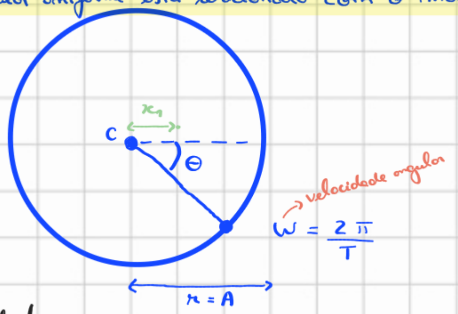
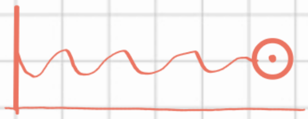
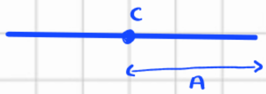
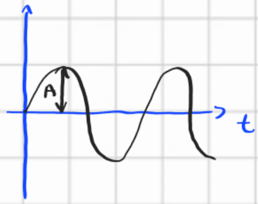
Movimento circular uniforme está relacionado com o movimento harmónico simples





Vista de lado:





a)

$$F_x = m\, a_x(t)$$
$$= m\,[x(t)]''$$
$$\circledast \to = -m\, w^2\, x(t)$$
$$= -\cancel{m}\left[\sqrt{\frac{K}{\cancel{m}}}\right]^2 x(t)$$
$$= -K\, x(t)$$

$$[x(t)]'_t = A\cos(wt+\phi)$$
$$= \underbrace{-wA\sin(wt+\phi)}_{v(t)}$$

$$[x(t)]''_t = -w^2 \underbrace{A\cos(wt+\phi)}_{x(t)}$$

b)

No instante inicial $(t=0)$ consideramos a $\underbrace{\text{amplitude máxima}}_{\text{pois } v=0}$ e $\boxed{\theta = wt + \phi = 0}$:

$$0 = wt + \phi$$
$$\boxed{t=0} \to 0 = \phi$$

Logo: $x(t) = A\cos(wt)$

$$\boxed{v(t) = -A\,w\,\sin(wt)}$$ exato , $w = \sqrt{\frac{K}{m}} = 1$

$$F_x = -K\,x(t)$$

$$a_x = -x(t)$$