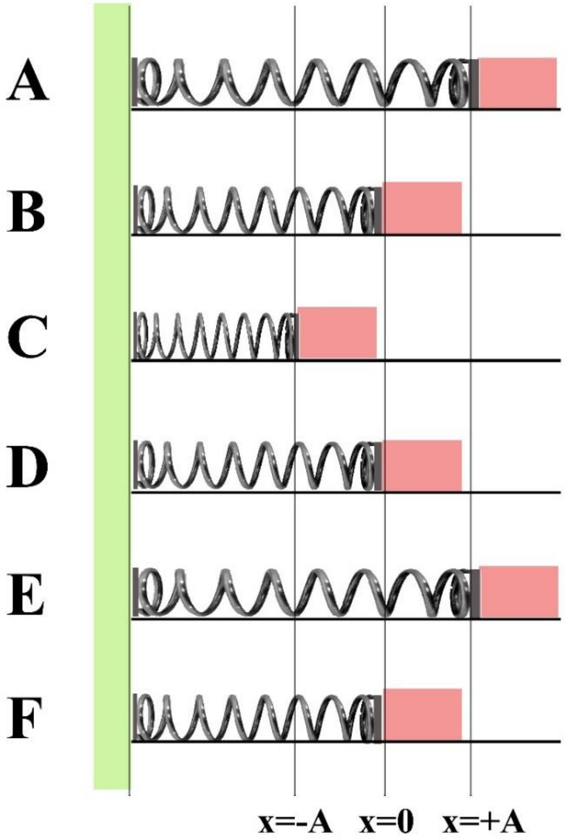
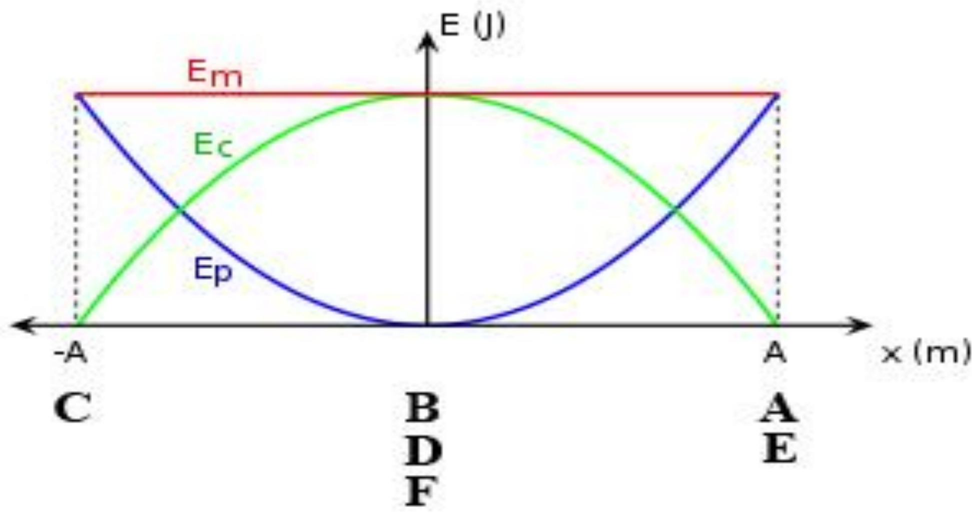
ENERGÍA MECÁNICA DEL MOVIMIENTO VIBRATORIO ARMÓNICO SIMPLE



A	$Ep_{máx}$	$Ec=0$
B	$Ep=0$	$Ec_{máx}$
C	$Ep_{máx}$	$Ec=0$
D	$Ep=0$	$Ec_{máx}$
E	$Ep_{máx}$	$Ec=0$
F	$Ep=0$	$Ec_{máx}$



$$\left.\begin{aligned} E_c &= \frac{1}{2}k\cdot(A^2-x^2) \\ Ep_e &= \frac{1}{2}k\cdot x^2 \end{aligned}\right\} E_m = \frac{1}{2}k\cdot A^2$$

MOVIMIENTO VIBRATORIO ARMÓNICO SIMPLE (M.V.A.S.)

CINEMÁTICA

$$Elongación: x = A \cdot sen\,\omega t$$

$$Velocidad: v = \frac{dx}{dt} = A \cdot \omega \cdot \cos \omega t$$

$$Aceleración: a = \frac{dv}{dt} = -A \cdot \omega^2 \cdot sen\,\omega t = \{x = A \cdot sen\,\omega t\} = -\omega^2 \cdot x$$

$x = A \cdot sen\,\omega t \Rightarrow sen\,\omega t = \frac{x}{A}$	$(sen\,\omega t)^2 + (\cos \omega t)^2 = 1 \Rightarrow \left(\frac{x}{A}\right)^2 + \left(\frac{v}{A \cdot \omega}\right)^2 = 1 \Rightarrow \frac{x^2}{A^2} + \frac{v^2}{A^2 \cdot \omega^2} = 1 \Rightarrow$ $\Rightarrow \omega^2 \cdot x^2 + v^2 = \omega^2 \cdot A^2 \Rightarrow v^2 = \omega^2 \cdot A^2 - \omega^2 \cdot x^2 \Rightarrow v = \omega \cdot \sqrt{A^2 - x^2}$
$v = A \cdot \omega \cdot \cos \omega t \Rightarrow \cos \omega t = \frac{v}{A \cdot \omega}$	

DINÁMICA

$Ley\ de\ Hooke: F = -k \cdot x$	$-k \cdot x = m \cdot a \Rightarrow \{a = -\omega^2 \cdot x\} \Rightarrow -k \cdot x = -m \cdot \omega^2 \cdot x \Rightarrow k = m \cdot \omega^2$
$2^a\ Ley\ de\ Newton: F = m \cdot a$	

ENERGÍA

$Ec = \frac{1}{2} \cdot m \cdot v^2 = \left\{k = m \cdot \omega^2 \Rightarrow m = \frac{k}{\omega^2}\right\} = \frac{1}{2} \cdot \frac{k}{\omega^2} \cdot v^2 =$ $= \left\{v = \omega \cdot \sqrt{A^2 - x^2}\right\} = \frac{1}{2} \cdot \frac{k}{\omega^2} \cdot \omega^2 \cdot \left(A^2 - x^2\right) = \frac{1}{2} \cdot k \cdot \left(A^2 - x^2\right)$	$Em = Ec + Ep_e = \frac{1}{2} \cdot k \cdot \left(A^2 - x^2\right) + \frac{1}{2} \cdot k \cdot x^2 =$ $= \frac{1}{2} \cdot k \cdot A^2 - \frac{1}{2} \cdot k \cdot x^2 + \frac{1}{2} \cdot k \cdot x^2 = \frac{1}{2} \cdot k \cdot A^2$
$Ep_e = \frac{1}{2} \cdot k \cdot x^2$	