سیستم T, KE, K U

$$E = \frac{1}{2}mv^2 + \frac{1}{2}kx^2$$

$\omega = \sqrt{\frac{k}{m}}$

$k = m\omega^2$

$F = -kx$

$PE \iota U = \frac{1}{2}kx^2$

$-\frac{dU}{dx} = -kx = F$

$V = \frac{dx}{dt}$

$x(t) = A\sin(\omega t + \delta)$

$v(t) = A\omega\cos(\omega t + \delta)$

$\frac{1}{2}mv^2(t) = A^2\omega^2\cos^2(\omega t + \delta)\ \frac{1}{2}m$

$+\ \frac{1}{2}kx^2 = A^2\omega^2\sin^2(\omega t + \delta)\ \frac{1}{2}\frac{m}{k}$

$E = \frac{1}{2}mA^2\omega^2\{\cos^2(\omega t + \delta) + \sin^2(\omega t + \delta)\}$

$E = \frac{1}{2}m\omega^2 A^2$

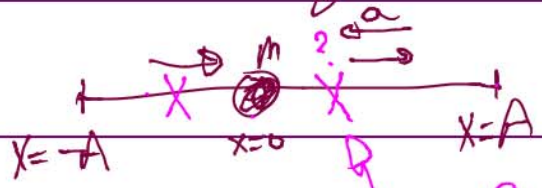
$E = \frac{1}{2}kA^2$

amplitude x_m

$\sin^2\phi + \cos^2\phi = 1$

$\frac{1}{2}kA^2 = E = \frac{1}{2}kx^2 + \frac{1}{2}mv^2$

$\frac{1}{2}kx^2$ $\quad K = \frac{1}{2}kA^2$

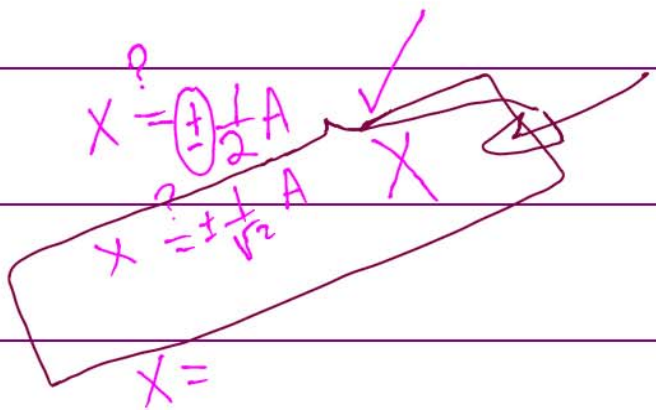


$x = ? = 0, A, \frac{1}{2}A, \frac{1}{4}, \frac{\sqrt{3}}{2}A$

$K = U$

$x = \pm\frac{\sqrt{2}}{2}A$

$K = U$ $\quad x = \alpha A$



$$E = K + U = \frac{1}{2} k A^2$$

$K = U$

$$U + U = \frac{1}{2} k A^2$$

$$2 * \frac{1}{2} k x^2 = \frac{1}{2} k A^2$$

$$x^2 = A^2/2 \Rightarrow x = \pm\sqrt{\frac{A^2}{2}}$$

$$= \pm \frac{A}{\sqrt{2}}$$

$$\simeq \pm 0.707\, A$$

$\sqrt{2} \simeq 1.41$

$\sqrt{3} \simeq 1.73$

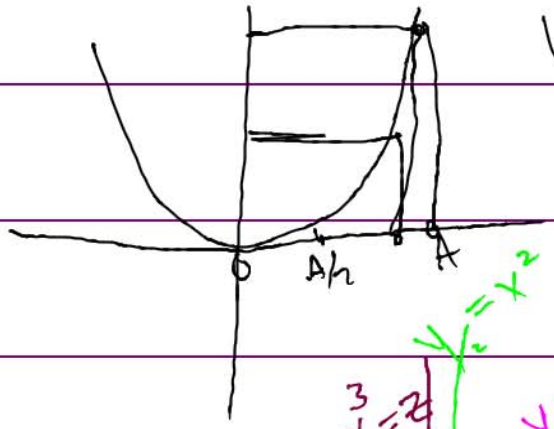
$1/\sqrt{2} \simeq 0.707$

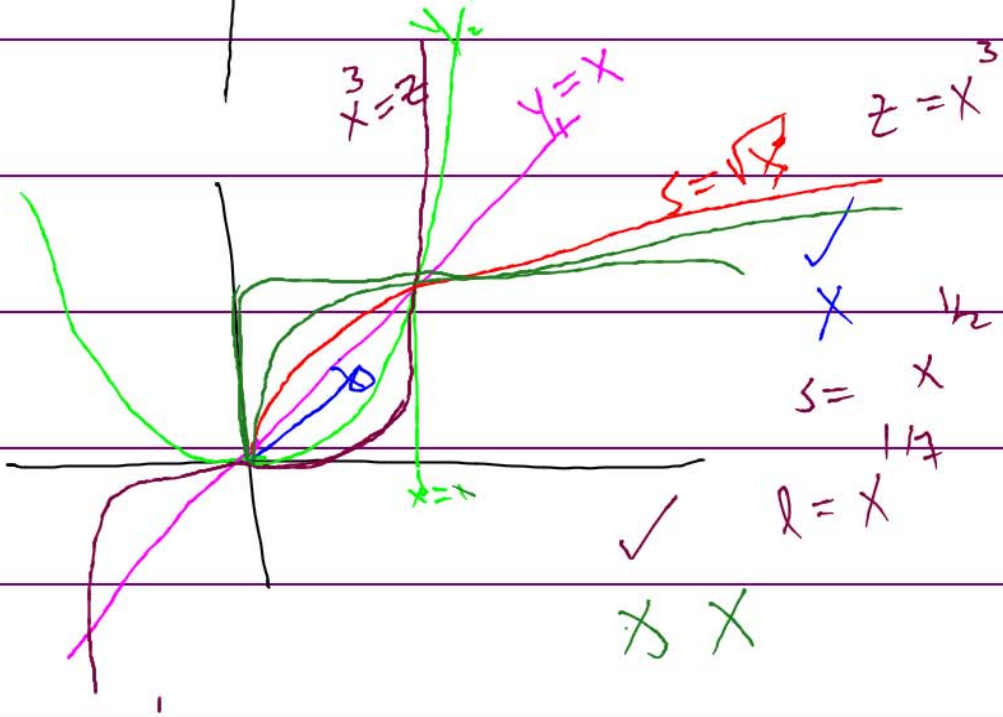
$A = 10\ mm = 1\ cm$

$x \simeq \pm 7\ mm$

$U = K$

$$U = \frac{1}{2} k x^2$$





$x \quad 1/2$

$s = x$

$1/7$

$l = x$

✓

✗ X