**Answer on Question #72881, Physics / Mechanics | Relativity |**

A body of mass 0.15 kg executes SHM described by the equation x(t) = 2sin(pt + p/ 4), where x is in meters and t is in seconds.
i) Determine the amplitude and time period of the oscillation.
ii) Calculate the initial values of displacement and velocity.
iii) Calculate the values of time when the energy of the oscillator is purely kinetic

**Solution:**
The motion of SHO is described by $x(t) = Asin(\omega t + \varphi_0)$, with $A$ being the amplitude, $\omega = \frac{2\pi}{T}$ being angular frequency, T — period, $\varphi_0$- phase.
*i) Determine the amplitude and time period of the oscillation.*
We have $x(t) = 2sin(\pi t + \pi/4)$. Thus $A = 2m$ and $T = 2s$.

*ii) Calculate the initial values of displacement and velocity.*
The initial value of displacement is

$$x(0) = 2sin(\pi/4) = \sqrt{2}\, m$$

The velocity is

$$v(t) = \frac{dx}{dt} = 2\pi cos(\pi t + \pi/4)$$

The initial value of velocity is
$v(0) = 2\pi cos(\pi/4) = \pi\sqrt{2}\, ms^{-1}$.

*iii) Calculate the values of time when the energy of the oscillator is purely kinetic.*
The energy of the oscillator is purely kinetic when $x(t) = 0$ or $t_n = \left(n - \frac{1}{4}\right)s$, with $n =$ 1,2,3,….
**Answer:** $A = 2\, m$ and $T = 2s$; $x(0) = \sqrt{2}m, v(0) = \pi\sqrt{2}ms^{-1}$; $t_n = \left(n - \frac{1}{4}\right)s$, with $n =$ 1,2,3,….