

### Answer on Question #65697-Physics-Mechanics

A simple harmonic motion is represented by

$$x(t) = \cos \omega t$$

Obtain expressions for velocity and acceleration of the oscillator. Also, plot the time variation of displacement, velocity and acceleration of the oscillator.

#### Solution

The velocity is

$$v(t) = \frac{dx}{dt} = -\omega \sin \omega t$$

The acceleration of the oscillator is

$$a(t) = \frac{dv}{dt} = -\omega^2 \cos \omega t$$

The plot of the time variation of displacement, velocity and acceleration of the oscillator for  $\omega = 1$ :

