

Answer on Question #51426, Physics, Other

a particle moves according to this law $x = a \cos \omega t$. calculate the distance travel in 2.5sec.

law of motion given is not clear

Solution:

In this problem particle undergoes Simple Harmonic Motion (SHM) with amplitude a .

In one period it goes from zero amplitude to maximum amplitude, back again to zero, the other direction to maximum amplitude and back to zero again. Thus, in one period the distance traveled is

$$d_1 = 4a$$

For given law of motion:

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

the time of one period is

$$T = \frac{2\pi}{\omega}$$

When the time of motion ratio to period is

$$\frac{t}{T} = n$$

where n is number of periods (real number in decimal notation).

In our case $t = 2.5$ sec.

$$n = \frac{t}{T} = \frac{2.5}{2\pi} \omega$$

The total distance is

$$d = 4 * n * a$$