

Answer on Question #59344 – Math – Trigonometry

Question

For the simple harmonic motion equation $d = 9 \cos\left(\frac{\pi}{2}t\right)$, what is the frequency? If necessary, use the slash (/) to denote a fraction. _____

Solution

Simple harmonic motion is

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

where A is the amplitude;

ω is the angular frequency ($\omega = 2\pi f$);

f is a frequency of the motion ($f = \frac{\omega}{2\pi}$).

So in case of the condition $x(t) = 9 \cos\left(\frac{\pi}{2}t\right)$, we get

$$\omega = \frac{\pi}{2} \left(\frac{rad}{sec}\right) \text{ and } f = \frac{\frac{\pi}{2}}{2\pi} = \frac{1}{4} (Hz)$$

Answer: $f = \frac{1}{4} = 1/4 (Hz)$

Question

Find a model for simple harmonic motion if the position at $t = 0$ is 0, the amplitude is 5 centimeters, and the period is 2 seconds.

$$d = 5 \cos(\pi t)$$

$$d = 5 \sin\left(\frac{\pi}{2}t\right)$$

$$d = 2 \cos(5\pi t)$$

$$d = 5 \sin(\pi t)$$

Solution

Simple harmonic motion is (if the position at $t = 0$ is 0):

$$x(t) = A \sin(\omega t),$$

where A is an amplitude;

ω is the angular frequency ($\omega = \frac{2\pi}{T}$);

T is the period.

So, in case of the conditions $A = 5$, $T = 2$, $\omega = \frac{2\pi}{2} = \pi$ ($\frac{rad}{sec}$) we get $x(t) = 5\sin(\pi t)$.

Answer: $x(t) = 5\sin(\pi t)$.