

Answer on Question #47660 – Physics – Other

Question.

The position of a particle is given by $x=(8.4 \text{ cm})\cos(6.0t)$, where t is in seconds. What is the frequency of the particle's motion? What is the period of the particle's motion? What is the amplitude of the particle's motion?

Given:

$$x = (8.4 \text{ cm}) \cos(6t)$$

Find:

$$f = ?$$

$$T = ?$$

$$A = ?$$

Solution.

Mathematically, the most basic wave has the following form:

$$x = A \cos \omega t$$

A is the amplitude;

ω is the angular frequency.

So, in our case we have:

$$A = 8.4 \text{ cm}$$

$$\omega = 6 \text{ Hz}$$

And we can express frequency f and period T through the angular frequency ω :

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

Therefore,

$$T = \frac{2\pi}{\omega} = \frac{6.28}{6} = 1.047 \text{ s}$$

$$f = \frac{\omega}{2\pi} = \frac{6}{6.28} = 0.955 \text{ Hz}$$

Answer.

$$f = 0.955 \text{ Hz}$$

$$T = 1.047 \text{ s}$$

$$A = 8.4 \text{ cm}$$