

**Answer on Question#38147 – Physics - Other**

A sinusoidal wave is described by

$$y(x,t) = 0.4 \sin(20.4(x - 95.5t)) \text{ cm}$$

where  $x$  is the position along the wave propagation. Determine the amplitude, wave number, wavelength, frequency and velocity of the wave.

**Solution:**

From the equation:

$$y(x,t) = 0.4 \sin(20.4(x - 95.5t)) \text{ cm}$$

$$y(x,t) = 0.4 \sin(20.4x - 1948.2t) \text{ cm}$$

Amplitude:  $A = 0.4 \text{ cm} = 0.004 \text{ m}$

Wave number:  $k = 20.4 \text{ cm}^{-1} = 2040 \text{ m}^{-1}$

Frequency:  $\omega = 1948.2 \text{ Hz}$ .

To get wavelength:

$$\lambda = \frac{2\pi}{k} = \frac{2\pi}{20.4 \text{ cm}^{-1}} = 0.308 \text{ cm} = 3080 \text{ } \mu\text{m}$$

To get wave velocity:

$$V = \lambda \cdot f = \lambda \cdot \frac{\omega}{2\pi} = 3080 \text{ } \mu\text{m} \cdot \frac{1948.2 \text{ Hz}}{2\pi} = 9.425 \times 10^6 \frac{\mu\text{m}}{\text{s}} = 9.42 \frac{\text{m}}{\text{s}}$$

**Answer:**  $A = 0.004 \text{ cm}$

$k = 2040 \text{ m}^{-1}$

$\omega = 1948.2 \text{ Hz}$ .

$\lambda = 3080 \text{ } \mu\text{m}$

$V = 9.42 \frac{\text{m}}{\text{s}}$ .