

Answer on Question #38002, Physics, Other

Question:

The equation of a wave is represented by: $y = 10^{-4} \sin\left(100t - \frac{x}{10}\right) m$, then the velocity of the wave will be:

- a) 100 m/s
- b) 1000 m/s
- c) 4 m/s
- d) 10 m/s

Answer:

Traveling sinusoidal wave is represented mathematically in terms of its velocity v (in the x direction) and wavenumber k as:

$$y(x, t) = A \sin(k(x - vt))$$

In our case equation of a wave is:

$$y = 10^{-4} \sin\left(100t - \frac{x}{10}\right) = 10^{-4} \sin\left(\frac{1}{10}(1000t - x)\right)$$

Therefore, velocity of wave equals:

$$v = 1000 \frac{m}{s}$$

Answer: b) 1000 m/s