

Physics 102Rec
Quiz#1
Chapter 17

Date: 10 Feb. 2002

Name: _____

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Sect: _____

A stretched string of mass 2.0 g and length 10 cm, carries a wave having the following displacement wave:

$$y(x, t) = 0.05 \sin(2\pi x - 400\pi t)$$

where x and y are in meters and t is in seconds.

(a) What is the speed of the wave?

$$v = \frac{\omega}{k} = \frac{400\pi}{2\pi} = 200 \text{ m/s}$$

(b) What is the tension in the string?

$$v = \sqrt{\frac{T}{\mu}} \Rightarrow T = v^2 \mu = (200)^2 \frac{2 \times 10^{-3}}{0.1} = 800 \text{ N}$$

(c) What is the transverse speed at $x = 0.5 \text{ m}$ and $t = 0 \text{ s}$?

$$u(x, t) = -400\pi (0.05) \cos(2\pi x - 400\pi t)$$

$$\begin{aligned} x = 0.5 \text{ m} \\ t = 0 \text{ s} \end{aligned} \Rightarrow u = -400\pi (0.05) \cos(\pi) \\ = 62.8 \text{ m/s}$$