properties of the string. The normal-mode frequencies of a stringed instrument determine the pitch of the musical sounds that the instrument produces.

- Not all waves are mechanical in nature. *Electromagnetic* waves—including light, radio waves, infrared and ultraviolet radiation, and x rays—can propagate even in empty space, where there is *no* medium.
- A **mechanical wave** is a disturbance that travels through some material or substance

QUESTIONS

1. A certain transverse wave is described by $y(x,t) = (6.50\ mm)\cos 2\pi\left(\frac{x}{28.0\ cm} - \frac{t}{0.0360\ s}\right)$

Determine the wave's (a) amplitude; (b) wavelength; (c) frequency; (d) speed of propagation; (e) direction of propagation.

2. A transverse wave on a rope is given by $y(x,t) = (0.750\ cm)\cos\pi[(0.400\ cm^{-1})x + (250\ s^{-1})t]$

(a) Find the amplitude, period, frequency, wavelength, and speed of propagation. (b) Sketch the shape of the rope at these values of t: 0, 0.0005 s, 0.0010 s. (c) Is the wave traveling in the $+x$ or $-x$ direction?