Chapter 16.

1. A wave is described by $y=0.0200 \sin (k x-\omega t)$, where $k=2.11 \mathrm{rad} / \mathrm{m}, \omega=3.62 \mathrm{rad} / \mathrm{s}, x$ and $y$ are in meters, and $t$ is in seconds. Determine (a) the amplitude, (b) the wavelength, (c) the frequency, and (d) the speed of the wave.
Ans:
2. The string shown in Figure P16.11 is driven at a frequency of 5.00 Hz . The amplitude of the motion is $A=12.0 \mathrm{~cm}$, and the wave speed is $v=20.0 \mathrm{~m} / \mathrm{s}$. Furthermore, the wave is such that $y=0$ at $x=0$ and $t=0$. Determine (a) the angular frequency and (b) the wave number for this wave. (c) Write an expression for the wave function. Calculate (d) the maximum transverse speed and (e) the maximum transverse acceleration of an element of the string.
Ans:


Figure P16.11
3. Transverse pulses travel with a speed of $200 \mathrm{~m} / \mathrm{s}$ along a taut copper wire whose diameter is 1.50 mm . What is the tension in the wire? (The density of copper is $8.92 \mathrm{~g} / \mathrm{cm}^{3}$.)

Ans:
4. A sinusoidal wave on a string is described by the wave function $y=0.15 \sin (0.80 x-50 t)$ where $x$ and $y$ are in meters and $t$ is in seconds. The mass per unit length of this string is 12.0 $\mathrm{g} / \mathrm{m}$. Determine (a) the speed of the wave, (b) the wavelength, (c) the frequency, and (d) the power transmitted by the wave.
Ans:
5. Transverse waves travel with a speed of $20.0 \mathrm{~m} / \mathrm{s}$ on a string under a tension of 6.00 N . What tension is required for a wave speed of $30.0 \mathrm{~m} / \mathrm{s}$ on the same string?.
Ans:

