Chapter 16 Problem 50

at $t = 0.00s$ $\quad y(x) = (0.30m)\sin(6.28m^{-1}x)$

so $A = 0.30m$

$k = 6.28m^{-1} \rightarrow k = \frac{2\pi}{\lambda} \rightarrow \lambda = \frac{2\pi}{k}$

$\lambda = \frac{2\pi}{6.28} = 1.00m$

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now wave travels $\Delta x = 4.00m$
in $\Delta t = 0.50s$

∴ The velocity is $v = \frac{\Delta x}{\Delta t} = \frac{4.00m}{0.50s} = 8\frac{m}{s}$

We know that

$v = \lambda \cdot f \rightarrow f = \frac{v}{\lambda} = \frac{8.00\,m/s}{1.00m} = 8\,Hz$

Now express it as angular frequency

$\omega = 2\pi f = 2\pi(8Hz) = 50.3\frac{rad}{s}$

The wave is traveling in the + direction
then the time dependence is subtracted

The resultant equation is

$$y(x,t) = (0.30m)\sin(6.28m^{-1}x - 50.3s^{-1}t)$$

s^{-1} is equivalent to $\frac{rad}{s}$