Class 4

$T = \frac{1}{f} = 1.28\,ms$

15.1 $\lambda = \frac{v}{f} = \frac{344\,m/s}{784\,1/s} = .439\,m$; $f \to 2f \Rightarrow \lambda \Rightarrow \frac{\lambda}{2} = .219\,m$

15.9 check: $\frac{\partial^2 y}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 y}{\partial t^2}$ ← const

(a) $-Ak^2\cos(kx+\omega t) = \frac{1}{v^2}A\omega^2\cos(kx+\omega t)$ if $v = \frac{\omega}{k}$ ✓

(b) same story with sin as $\sin'' = -\sin$

(c) NO $-Ak^2\cos(kx) \neq \frac{1}{v^2}\,-\omega^2 A\cos(\omega t)$

b: $y = A\sin(kx+\omega t)$

$v_y = A\omega\cos(kx+\omega t)$

$a_y = -A\omega^2\sin(kx+\omega t)$

15.10 $A = 2.75\,cm$ $k = .41\,1/cm$ $\omega = 6.2\,\frac{1}{s}$

$T = \frac{2\pi}{\omega} = 1.01\,s$ $f = \frac{\omega}{2\pi} = .987\,Hz$

$v = \frac{\omega}{k} = 15.1\,cm/s$ $(v_y)_{max} = A\omega = (2.75\,cm)(6.2) = 17\,cm/s$

15.11 $A = 4mm$ $T = .04\,s$ peak travels $\sim \frac{.09m}{.025s} = 3.6\,m/s$

← how long does it take the peak to move from $x=0$ to $x=.09$?

$\lambda = (v)(T) = .144\,m$

backward $\frac{.09m}{.015s} = 6\,m/s$ $\lambda = vT = .24\,m$

← how long does it take the peak to move from .09 to 0