

Workshop Handout #1.

$$1. \quad T = \frac{1}{f} = \frac{1}{\frac{\omega}{2\pi}} = \frac{2\pi}{\omega}$$

$$T \sim \frac{1}{\omega} \quad \leftarrow \text{proportional} \quad \Rightarrow \quad \boxed{\begin{array}{l} T_1 = T_3 ; \\ T_2 = T_4 \end{array}}$$

$$2. \quad v = \frac{\omega}{k} \quad \text{I: } v = \frac{2}{3} \quad \text{II: } \frac{3}{6} = \frac{1}{2}$$

$$\text{III: } v = \frac{6}{3} = 2 \quad \text{IV: } \frac{1}{1.5} = \frac{2}{3}$$

$$\boxed{v_1 = v_4}$$

$$3. \quad T = 12 \text{ h.} \quad A = 1.5 \text{ m} ; \quad v = 750 \text{ km/hr}$$

$$\lambda = \frac{v}{f} = vT = (750 \text{ km/hr}) (12 \text{ hr}) \\ = \boxed{750 \cdot 12 \text{ km}}$$

$$4. \quad a) \quad T = \frac{2\pi}{\omega} = \boxed{\frac{2\pi}{7.22} \text{ s}}$$

$$b) \quad \lambda = \frac{2\pi}{k} = \boxed{\frac{2\pi}{3.25} \text{ m}}$$

$$c) \quad v = \frac{\omega}{k} = \boxed{\frac{7.22}{3.25} \text{ m/s}}$$

$$5. \quad v_{\max} = A\omega = (0.0020) (52\pi)$$

6. a) Hecho en clase.

$$b) \quad \frac{d^2 y}{dx^2} = -A k^2 \sin(kx + \omega t)$$

$$\frac{d^2 y}{dt^2} = -A \omega^2 \sin(kx + \omega t) \quad \frac{1}{v^2} = \frac{k^2}{\omega^2}$$

$$\Rightarrow \frac{d^2}{dx^2} y(x, t) \stackrel{?}{=} \frac{1}{v^2} \frac{d^2}{dt^2} y(x, t)$$

$$\Rightarrow -A k^2 \sin(kx + \omega t) \stackrel{?}{=} \frac{1}{v^2} [-A \omega^2 \sin(kx + \omega t)]$$

✓

$$c) \quad \frac{d^2 y}{dx^2} = -A k^2 \cos kx$$

$$\frac{d^2 y}{dt^2} = -A \omega^2 \cos \omega t$$

$$\frac{d^2 y}{dx^2} \stackrel{?}{=} \frac{1}{v^2} \frac{d^2 y}{dt^2} \Rightarrow \cos kx \stackrel{?}{=} \cos \omega t \quad X$$