UNIT 9 PROBLEMS

NINE

Name _____

Pd. 2

1. If a wave source produces 30 pulses every 5 seconds, calculate its period and frequency.

$f = \frac{30 \text{ pulses}}{5 \text{ sec}} = 6 \frac{\text{pulses}}{\text{sec}} = 6 \text{ hz}$

$T = \frac{1}{f} = \frac{1}{6/s} = \frac{1}{6} \text{ sec}$

$f = 6 \, s^{-1}$

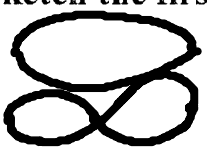
2. A wave tank produces a wave every 0.25 seconds with $\lambda = 5$ cm. (.05m) What is wave speed?

$T = \frac{1}{4} \text{ sec}$

$f = \frac{1}{T} = \frac{1}{1/4 \, s} = 4 \text{ hz}$

$V = f\lambda = (4 \, s^{-1})(.05 \text{ m}) = .20 \text{ m/s}$

3. A 80 cm-long (.8m) string fixed at both ends vibrates with a frequency of 440 Hz. Sketch the first three harmonics and calculate the wave speeds of each.

1st H  $L = \frac{\lambda}{2}$ $.8 \text{ m} = \frac{\lambda}{2}$ $\lambda = 1.6 \text{ m}$ $V = (1.6 \text{ m})(440 \text{ hz}) =$

2nd H  $L = \lambda$ $.8 \text{ m} = \lambda$ $\lambda =$ $V = (.8 \text{ m})(440 \text{ hz})$ $V = 352.0 \text{ m/s}$

3rd H $L = \frac{3}{2}\lambda$ $.8 \text{ m} = \frac{3}{2}\lambda$ $\lambda =$ $V =$

4. In an experiment to calculate the speed of sound, a 480 Hz (f) tuning fork causes resonance in an 18 cm-long (.18m) closed tube. Calculate the speed of sound.

$.18 \text{ m} = \frac{\lambda}{4}$

$\lambda = .72 \text{ m}$

$V = f\lambda = (480 \text{ hz})(.72 \text{ m})$

$V = \_\_\_\_\_ \text{ m/s}$

5. Calculate the fundamental frequency (1st harmonic) for an open tube of length 1.25 m. Use v = 340 m/s.

$V = f\lambda$

$1.25 \text{ m} = \frac{\lambda}{2}$

$\lambda = 2.5 \text{ m}$

$f = \frac{V}{\lambda} = \frac{340 \text{ m/s}}{2.5 \text{ m}} =$