Mr. Jenkins Physics I

Assignment Sheet
Waves and Sound

Objectives
You will be able to:

A. define or explain what a wave does (transports energy), amplitude and its relationship to the energy of the wave, period, frequency, wavelength.
   distinguish between transverse wave and longitudinal wave and give examples of each.
B. define pulse, wave speed and its relationship to the medium in which the wave is traveling.
   explain the effect of tension and rope mass per unit length on the wave speed.
   define or explain hertz, damping, resonance, wave crest and trough, node, antinode, standing wave, and the principle of superposition.
   (Reflection, refraction, and diffraction will be picked up with light.)
C. explain why a sound wave cannot travel through a vacuum.
   relate the relative intensity of the sound sources of two sounds given their intensity level in dB.
   define or explain sound wave, compression and rarefaction, wave front (spherical wave), sound intensity and its relationship to distance from the source, infrasound, ultrasound, decibel
   explain and calculate what happens to the observed frequency when listener and/or sound source are moving.
D. explain wave resonance and harmonics in terms of the principal of superposition.
   explain and sketch the harmonics for waves in string and closed or open tubes.
   explain the interference of sound waves and beats.
   define constructive and destructive interference, pitch, and quality.
E. explain the generation of a shock wave for an object moving faster than the speed of sound.
   explain what happens to the angle of the shock wave (Mach angle) as the ratio of the speed of the object to the local sound speed (Mach number) increases.

Reading

A. 14-1, Types of Wave, p. 453–455
B. 14-2, Waves on a String, p. 455–458
C. 14-4, Sound Waves, p. 459–463
   14-5, Sound Intensity, p. 463–468
   14-6, The Doppler Effect, p. 468–474
D. 14-7, Superposition and Interference, p. 474–477
   14-8. Standing Waves, p. 478–485
   14-9, Beats, p. 485–487
E. Supersonic speed, handout

Focus Questions

1. A wave pulse travels down a Slinky, but the Slinky itself does not change position. Does a transfer of energy take place in this process? Explain.
2. Consider a piano string.
   a. If you increase the length of the string, does the wavelength of the wave on the string increase or decrease? Explain.
   b. If you double the mass per unit length of the string, what effect does this have on the speed of the wave in the string? Explain.
   c. Suppose that you increase the tension in the string by tightening the tuning knob, what effect does this have on the frequency of the wave produced? Explain.
3. Is the wavelength of the fundamental standing wave in a tube open on both ends greater than, less than, or equal to the wavelength for the fundamental wave in a tube open at just one end? Explain.