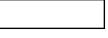HW 6.1 Waves   Per _____ Name _____

1.   A piano emits frequencies that range from a low of about 28 Hz to a high of about 4200 Hz. Find the range of
     wavelengths in air attained by this instrument when the speed of sound in air is 340 m/s.

                                                                                    [   ]

2.   The speed of all electromagnetic waves in empty space is 3.00 E 8 m/s. Calculate the wavelength of electro-
     magnetic waves emitted at the following frequencies:

        a) radio waves at 88.0 MHz   [   ]

        b) visible light at 6.0 E 8 MHz   [   ]

        c) X-rays at 3.0 E 12 MHz   [   ]

3.   The red light emitted by a He-Ne laser has a wavelength of 633 nm in air and travels at 3.00 E 8 m/s. Find the
     frequency of the laser light. (1 nm = 1 E –9 m)

                                                                                    [   ]

4.   A tuning fork produces a sound with a frequency of 256 Hz and a wavelength in air of 1.35 m.

        a) What value does this give for the speed of sound in air?

                                                                                    [   ]

        b) What would be the wavelength of the wave produced by this tuning fork in water in which sound travels
            at 1500 m/s?

                                                                                    [   ]

5.   As waves pass by a duck floating on a lake, the duck bobs up and down but remains in essentially one place.
     Explain why the duck is not carried along by the wave motion.

6. The smallest insects that a bat can detect are approximately the size of one wavelength of the sound the bat
    makes. What is the minimum frequency of sound waves required for the bat to detect an insect that is 0.57 cm
    long? (Assume the speed of sound is 340 m/s.)

                                                                                    [   ]

_____ 1. A leaf on a pond oscillates up and down two complete cycles each second as a water wave passes. What is the wave's frequency?
   a. 2 Hz   b. 6 Hz   c. 1 Hz   d. .5 Hz

_____ 2. The higher the frequency of a wave
   a. the shorter its wavelength   c. the longer its period
   b. the lower its speed   d. the greater its amplitude

_____ 3. In space no one can hear you scream because sound is a(n) ___ wave.
   a. transverse mechanical   c. compressional electromagnetic
   b. transverse electromagnetic   d. compressional mechanical

_____ 4. The amplitude of a particular wave is 1 meter. The total distance from the top of a crest to the bottom of a trough would be
   a. 1 m   c. 0.5 m
   b. 2 m   d. none of the answers is correct

_____ 5. The distance between successive identical parts of a wave is called its
   a. amplitude   b. frequency   c. period   d. wavelength

_____ 6. An unsuccessful fisherman fishing from a pier observes that four wave crests pass by in 7.0 s and estimates the distance between two successive crests to be 4.0 m. The timing starts with the first crest and ends with the fourth. What is the speed of the wave?
   a. 2.29 m/s   b. 7 m/s   c. 1.7 m/s   d. 0.571 m/s

_____ 7. Waves move along a string at a speed of 8 m / s. The end of the string vibrates up and down once every 1.5 seconds. What is the wavelength of the waves traveling along the string?
   a. 5.3 m   b. 12 m   c. 6 m   d. 3 m

_____ 8. A periodic longitudinal wave that has a frequency of 20 Hz travels along a slinky. An overzealous physics student notes that the distance between successive compressions is 0.4 m. What is the speed of the wave?
   a. 3 E 8 m/s   b. 0.02 m/s   c. 8 m/s   d. 50 m/s

_____ 9. The source of all wave motion is a
   a. vibrating object   c. harmonic object
   b. variable high and low pressure region   d. wave pattern

_____ 10. Which of the following is the region of a longitudinal wave in which the density and pressure are lower than normal?
   a. compression   c. spherical wave
   b. rarefaction   d. Doppler effect