Ch 14 and 15 Review

14.1 Conceptual Questions

_____ 1) Seven seconds after a brilliant flash of lightning, thunder shakes the house. Approximately how far was the lightning strike from the house?
A) much closer than one kilometer
B) about one kilometer away
C) about two kilometers away
D) much farther away than two kilometers
E) It is impossible to say.

_____ 2) What characteristics of a sound wave are related to the "pitch" of a musical note? (There could be more than one correct choice.)
A) amplitude
B) wavelength
C) frequency
D) period

_____ 3) Sound A has a high pitch and sound B has a low pitch. Which of the following statements about these two sounds are correct? (There could be more than one correct choice.)
A) The wavelength of A is longer than the wavelength of B.
B) The period of A is shorter than the period of B.
C) The frequency of A is greater than the frequency of B.
D) Sound B travels faster than sound B through air.
E) The amplitude of A is larger than the amplitude of B.

_____ 4) Suppose that a sound source is emitting waves uniformly in all directions. If you move to a point twice as far away from the source, the frequency of the sound will be
A) unchanged.
B) half as great.
C) one-fourth as great.
D) twice as great.

_____ 5) Two tuning forks have frequencies of 440 and 522 Hz. What is the beat frequency if both are sounding simultaneously?
A) 962 Hz
B) 481 Hz
C) 82 Hz
D) 55 Hz
E) 41 Hz

_____ 6) Two pure tones are sounded together and a particular beat frequency is heard. What happens to the beat frequency if the frequency of one of the tones is increased?
A) It increases.
B) It decreases.
C) It does not change.
D) It could either increase or decrease.

____ 7) A music tuner uses a 554-Hz C# tuning fork to tune the frequency of a musical instrument. If the tuner hears a beat frequency of 2 Hz, what is the frequency of the instrument?
A) It must be 556 Hz.
B) It must be 552 Hz.
C) It could be either 556 Hz or 552 Hz.
D) It could be either 553 Hz or 555 Hz.
E) It is neither 556 Hz or 552 Hz.

____ 8) As you are moving very quickly toward a speaker emitting a pure tone, which characteristics of the sound get larger? (There may be more than one correct choice.)
A) frequency
B) amplitude
C) wavelength
D) period
E) loudness

____ 9) In many cartoon shows, a character runs off a cliff, realizes his predicament, and lets out a scream. He continues to scream as he falls. If the physical situation is portrayed correctly, from the vantage point of an observer at the *top* of the cliff leaning over the edge, the pitch of the scream as he falls should be
A) higher than the original pitch and constant.
B) higher than the original pitch and increasing as he falls.
C) lower than the original pitch and constant.
D) lower than the original pitch and decreasing as he falls.
E) It is impossible to predict.

14.2 Problems

10) An elephant can hear sound with a frequency of 15 Hz. What is the wavelength of this wave if the speed of sound in air is 343 m/s?

____ 11) The speed of sound through the ground is about 6.0 km/s while the speed of sound in air is 343 m/s. A very powerful explosion occurs some distance away and you feel the ground vibrate 60 seconds before you hear the sound of the explosion. How far away is the explosion?
A) 20 km
B) 22 km
C) 25 km
D) 27 km
E) 30 km

15.1 Conceptual Questions

____ 12) Which one of the following is *not* an electromagnetic wave?
   A) ultraviolet
   B) infrared
   C) radio waves
   D) sound waves
   E) gamma rays

____ 13) Which one of the following lists gives the correct order of the electromagnetic waves from *longer wavelength to shorter wavelength*?
   A) radio waves, infrared, microwaves, ultraviolet, visible, x-rays, gamma rays
   B) radio waves, ultraviolet, x-rays, microwaves, infrared, visible, gamma rays
   C) radio waves, microwaves, visible, x-rays, infrared, ultraviolet, gamma rays
   D) radio waves, microwaves, infrared, visible, ultraviolet, x-rays, gamma rays
   E) radio waves, infrared, x-rays, microwaves, ultraviolet, visible, gamma rays

____ 14) In an electromagnetic wave in free space, the electric and magnetic fields are
   A) parallel to one another and perpendicular to the direction of wave propagation.
   B) parallel to one another and parallel to the direction of wave propagation.
   C) perpendicular to one another and perpendicular to the direction of wave propagation.
   D) perpendicular to one another and parallel to the direction of wave propagation.

____ 15) Which of the following statements about electromagnetic waves in free space are true? (There could be more than one correct choice.)
   A) The higher-frequency travel faster than the lower-frequency waves.
   B) The higher-frequency waves have shorter wavelengths than the lower-frequency waves.
   C) The wavelengths of the visible waves are some of the longest electromagnetic waves.
   D) The wavelengths of the visible waves are some of the shortest electromagnetic waves.
   E) The electric field vector is always at right angles to the magnetic field vector.

____ 16) Which one of the following types of electromagnetic wave travels through space the fastest?
   A) radio waves
   B) infrared
   C) ultraviolet
   D) microwaves
   E) They all travel through space at the same speed.

15.2 Problems

17) A cordless phone operates at 900 MHz. What is the wavelength of the electromagnetic wave used by this phone? ($c = 3.0 \times 10^8$ m/s)

18) An FM radio station broadcasts at 96.7 MHz. What is the wavelength of the radio wave used for this broadcast? ($c = 3.0 \times 10^8$ m/s)

19) What is the wavelength used by a radio station that broadcasts at a frequency of 920 kHz? ($c = 3.00 \times 10^8$ m/s)
    A) 22.6 m
    B) 226 m
    C) 326 m
    D) 175 m
    E) 276 m

20) The distance between two asteroids is 1600 km. How much time does it take for a light signal to go from one asteroid to the other? ($c = 3.0 \times 10^8$ m/s)
    A) 19 ms
    B) 4.5 ms
    C) 5.3 ms
    D) 13 ms
    E) 19 μs