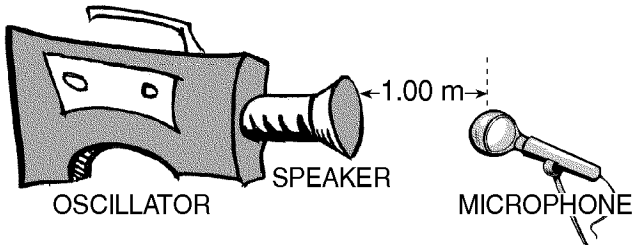
Questions 5 and 6 refer to the following:

A system consists of an oscillator and a speaker that emits a 1,000.-hertz sound wave. A microphone detects the sound wave 1.00 meter from the speaker.



5) What type of wave is emitted by the speaker in the given diagram?
A) electromagnetic B) circular C) longitudinal D) transverse

6) The microphone in the given diagram is moved at constant speed from a position at 0.50-meter back to its original position 1.00 meter from the speaker. Compared to the 1,000.-hertz frequency emitted by the speaker, the frequency detected by the moving microphone is
A) lower B) the same C) higher

7) Which phenomenon occurs when an object absorbs wave energy that matches the object's natural frequency?
A) interference B) reflection C) diffraction D) resonance

8) Rubbing a moistened finger around the rim of a water glass transfers energy to the glass at the natural frequency of the glass. Which wave phenomenon is responsible for this effect?

9) A 512-hertz sound wave travels 100. meters to an observer through air at STP. What is the wavelength of this sound wave?

10) A train sounds a whistle of constant frequency as it leaves the train station. Compared to the sound emitted by the whistle, the sound that the passengers standing on the platform hear has a frequency that is
A) higher, because the sound waves travel faster in the still air above the platform than in the rushing air near the train
B) higher, because the sound-wave fronts reach the platform at a frequency higher than the frequency at which they are produced
C) lower, because the sound-wave fronts reach the platform at a frequency lower than the frequency at which they are produced
D) lower, because the sound waves travel more slowly in the still air above the platform than in the rushing air near the train

11) An opera singer's voice is able to break a thin crystal glass when the singer's voice and the vibrating glass have the same
A) amplitude B) frequency C) wavelength D) speed

12) The hertz is a unit that describes the number of
A) seconds it takes to complete one cycle of a wave
B) points that are out of phase along one meter of a wave
C) cycles of a wave completed in one second
D) points that are in phase along one meter of a wave

13) A tuning fork vibrating in air produces sound waves. These waves are *best* classified as
A) longitudinal, because the air molecules are vibrating perpendicular to the direction of wave motion
B) transverse, because the air molecules are vibrating perpendicular to the direction of wave motion
C) longitudinal, because the air molecules are vibrating parallel to the direction of wave motion
D) transverse, because the air molecules are vibrating parallel to the direction of wave motion

14) A radar gun can determine the speed of a moving automobile by measuring the difference in frequency between emitted and reflected radar waves. This process illustrates what phenomenon?
A) resonance B) Doppler effect C) refraction D) diffraction

15) An electric guitar is generating a sound of constant frequency. An increase in which sound wave characteristic would result in an increase in loudness?
A) speed B) period C) amplitude D) wavelength

16) A tuning fork oscillates with a frequency of 256 hertz after being struck by a rubber hammer. Which phrase *best* describes the sound waves produced by this oscillating tuning fork?
A) electromagnetic waves that require a medium for transmission
B) mechanical waves that require no medium for transmission
C) electromagnetic waves that require no medium for transmission
D) mechanical waves that require a medium for transmission

17) The energy of a sound wave is most closely related to its
A) wavelength B) frequency C) period D) amplitude

18) Using one or more complete sentences, define the Doppler effect.

19) A person observes a fireworks display from a safe distance of 0.750 kilometer. Assuming that sound travels at 340. meters per second in air, what is the time between the person seeing and hearing a fireworks explosion?

20) A source of sound waves approaches a stationary observer through a uniform medium. Compared to the frequency and wavelength of the emitted sound, the observer would detect waves with a
A) lower frequency and longer wavelength
B) lower frequency and shorter wavelength
C) higher frequency and longer wavelength
D) higher frequency and shorter wavelength