CHAPTER 12 Review

SOUND WAVES

Review Questions

1. Why are sound waves in air characterized as longitudinal?

2. Draw the sine curve that corresponds to the sound wave depicted below.

3. What is the difference between frequency and pitch?

4. What are the differences between infrasonic, audible, and ultrasonic sound waves?

5. Explain why the speed of sound depends on the temperature of the medium. Why is this temperature dependence more noticeable in a gas than in a solid or a liquid?

6. You are at a street corner and hear an ambulance siren. Without looking, how can you tell when the ambulance passes by?

7. Why do ultrasound waves produce images of objects inside the body more effectively than audible sound waves do?

Conceptual Questions

8. If the wavelength of a sound source is reduced by a factor of 2, what happens to the wave's frequency? What happens to its speed?

9. As a result of a distant explosion, an observer first senses a ground tremor, then hears the explosion. What accounts for this time lag?

10. By listening to a band or an orchestra, how can you determine that the speed of sound is the same for all frequencies?

11. A fire engine is moving at 40 m/s and sounding its horn. A car in front of the fire engine is moving at 30 m/s, and a van in front of the car is stationary. Which observer hears the fire engine's horn at a higher pitch, the driver of the car or the driver of the van?

12. A bat flying toward a wall emits a chirp at 40 kHz. Is the frequency of the echo received by the bat greater than, less than, or equal to 40 kHz?

SOUND INTENSITY AND RESONANCE

Review Questions

13. What is the difference between intensity and decibel level?

14. Using **Table 2** (Section 2) as a guide, estimate the decibel levels of the following sounds: a cheering crowd at a football game, background noise in a church, the pages of this textbook being turned, and light traffic.

15. Why is the threshold of hearing represented as a curve in **Figure 9** (Section 2) rather than as a single point?

16. Under what conditions does resonance occur?

Conceptual Questions

17. The decibel level of an orchestra is 90 dB, and a single violin achieves a level of 70 dB. How does the sound intensity from the full orchestra compare with that from the violin alone?

18. A noisy machine in a factory produces a decibel rating of 80 dB. How many identical machines could you add to the factory without exceeding the 90 dB limit set by federal regulations?

19. Why is the intensity of an echo less than that of the original sound?