

In this chapter, you will be able to

- describe and understand sound, its transmission, and its production
- understand why the speed of sound varies
- give examples of sound intensity on the decibel scale
- explain how sounds are produced and transmitted in nature
- understand sound interference
- explain the Doppler effect

Properties of Sound Waves

The characteristics and nature of waves were the topics studied in Chapter 6. Since sound waves form one of our major sensory links to the world, it is important that we understand the properties of sound waves and hearing. Without sound we would be denied the ability to communicate by speech with one another, the pleasures of musical sound, and the ability to know when someone has approached us from behind.

Imagine you are asked to describe sound and hearing to someone who has been unable to hear since birth. Perhaps you would begin by describing the sounds of voices, music, radio, television, animals, and machines. You might then describe how sound is produced and transmitted. You could explain the relationship between vibrations and waves as discussed in the previous chapter. You could describe how a wineglass could be shattered by the amplified sound of a human voice (**Figure 1**). Finally, you could describe the physical functions of the human ear. In this chapter, we will study the characteristics of sound waves and how the human ear receives and interprets sound energy.

Reflect on your Learning

1. What is sound?
2. Explain how the human ear receives and interprets sound.
3. Why does the speed of sound differ in different media?
4. How can echoes be used to locate objects?
5. Why do planes make a large noise when they break the sound barrier?

Throughout this chapter, note any changes in your ideas as you learn new concepts and develop your skills.

Figure 1

The energy of amplified sound waves causes the wine glass to shatter.

**Try This
Activity**

Vibrating Tuning Fork

Tuning forks are often used as a source of sound energy in scientific activities. You will use a tuning fork, a Styrofoam cup, a rubber hammer, and a pith ball to look at some properties of sound waves.

- Strike a low-frequency tuning fork with a rubber hammer, and touch the prongs to the surface of water in a cup. Describe what happens and why.
- Touch a vibrating tuning fork to a suspended pith ball (**Figure 2**). Describe what happens and why.

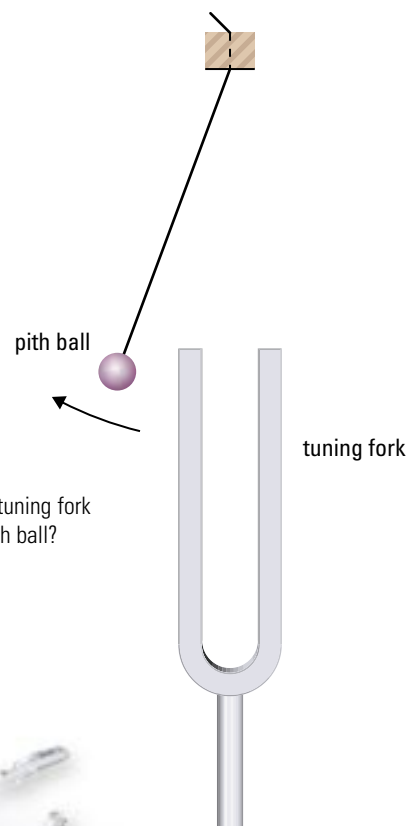


Figure 2

What happens when the vibrating tuning fork is brought close to a suspended pith ball?

