

**Chapter 26 Sound**

**Exercises**

**26.1 The Origin of Sound (page 515)**

*Match each sound source with the part that vibrates.*

Sound Source	Vibrating Part
_____ 1. violin	a. strings
_____ 2. your voice	b. reed
_____ 3. saxophone	c. column of air at the mouthpiece
_____ 4. flute	d. vocal chords

5. Sound waves are a type of \_\_\_\_\_ wave.
6. What normally determines the frequency of sound waves?
- \_\_\_\_\_
- \_\_\_\_\_

7. Define pitch.

\_\_\_\_\_

8. As people grow older, they often have more trouble hearing sounds at the \_\_\_\_\_ end of the range of frequencies.

9. Sound waves with frequencies below the normal range are \_\_\_\_\_ waves.

10. Sound waves with frequencies above the normal range are \_\_\_\_\_ waves.

**26.2 Sound in Air (pages 515–517)**

11. Is the following sentence true or false? Sound vibrates the air much like particles move back and forth along a stretched spring. \_\_\_\_\_

12. A pulse of compressed air is called a \_\_\_\_\_, and a pulse of low-pressure air is called a \_\_\_\_\_.

13. For all wave motion, it is not the \_\_\_\_\_ that travels, but a \_\_\_\_\_ that travels.

14. Explain what happens when a tuning fork is struck against one end of an open tube.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**26.3 Media That Transmit Sound (page 517)**

15. What did Native Americans learn long ago when they put their ears to the ground?

\_\_\_\_\_

\_\_\_\_\_

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16. Suppose a friend far away taps a metal fence. Circle the letter of the true statement.
- The sound is softer and travels slower through the metal than through air.
  - The sound is louder and travels slower through the metal than through air.
  - The sound is softer and travels faster through the metal than through air.
  - The sound is louder and travels faster through the metal than through air.
17. Circle the letter of the best conductor of sound.
- a gas
  - a liquid
  - a solid
  - a vacuum
18. Suppose a ringing bell is placed inside a sealed jar filled with air. The air is then removed from the jar, creating a vacuum. Describe the difference in what a person nearby hears before and after the air is removed from the jar.

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### 26.4 Speed of Sound (page 518)

19. Is the following sentence true or false? During a thunderstorm, you hear the thunder before you see the lightning. \_\_\_\_\_
20. The speed of sound in a gas depends primarily on \_\_\_\_\_ and \_\_\_\_\_.
21. Circle the letter of the speed of sound in dry air at  $0^{\circ}\text{C}$ .
- 20 m/s
  - 330 m/s
  - 60 m/s
  - 1200 m/s
22. \_\_\_\_\_ in the air increases the speed of sound in air.
23. For each degree increase in air temperature above  $0^{\circ}\text{C}$ , the speed of sound in air increases about \_\_\_\_\_ m/s.
24. The speed of sound at normal room temperature is about \_\_\_\_\_.
25. Do lighter gas particles transmit sound faster or slower than heavier gases found in air? \_\_\_\_\_
26. Is the following sentence true or false? The speed of sound in a solid material depends not on the material's density, but on its elasticity.

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### 26.5 Loudness (page 519)

27. What is the intensity of sound proportional to?

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28. Is the following sentence true or false? Sound intensity is a physiological sensation, but loudness can be measured by instruments. \_\_\_\_\_

Sound Levels	
Source of Sound	Level (dB)
Jet engine, at 30 m	140
Old subway train	100
Average factory	90
Normal speech	60
Library	40

29. Study the table above. Circle the letter beside the source of sound that is 100 times as intense as the normal sound of a library.

- a. Jet engine, at 30 m
- b. Old subway train
- c. Average factory
- d. Normal speech

30. Physiological hearing damage begins at exposure to \_\_\_\_\_ decibels.

31. Is the following sentence true or false? The cells of the receptor organ in the inner ear do not regenerate. \_\_\_\_\_

**26.6 Natural Frequency (page 520)**

32. Define natural frequency.

\_\_\_\_\_

33. Circle the letter of the properties upon which an object’s natural frequency depends.

- a. elasticity and shape
- b. mass and shape
- c. volume and elasticity
- d. volume and mass

34. Is the following sentence true or false? A natural frequency is one at which maximum energy is required to produce forced vibrations.

\_\_\_\_\_

**26.7 Forced Vibration (page 520)**

35. Why is the sound made by an unmounted tuning fork faint when compared to the sound of the fork when its base is on a tabletop?

\_\_\_\_\_  
\_\_\_\_\_

36. Define forced vibration.

\_\_\_\_\_  
\_\_\_\_\_

37. The part of any stringed musical instrument that undergoes forced vibration and makes the sound you hear is a \_\_\_\_\_.

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**26.8 Resonance (pages 521–522)**

38. Define resonance.

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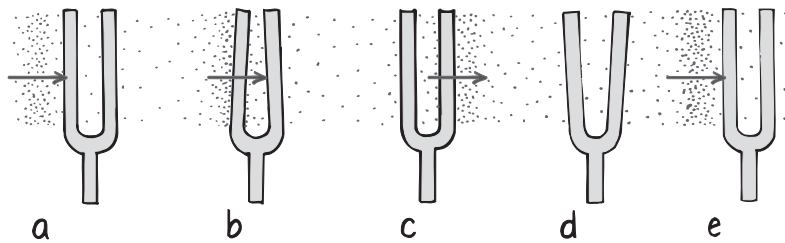
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39. Describe how a child’s swing illustrates resonance.

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40. Describe what is happening to the tuning fork shown in the figure above.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_

41. Describe how resonance affects the way you listen to a radio.

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**26.9 Interference (pages 522–523)**

- 42. A \_\_\_\_\_ of a sound wave corresponds to a crest of a transverse wave.
- 43. A \_\_\_\_\_ of a sound wave corresponds to a trough of a transverse wave.
- 44. When the crests of one wave overlap the crests of another wave, there is \_\_\_\_\_ interference and an increase in \_\_\_\_\_.
- 45. When the crests of one wave overlap the troughs of another wave, there is \_\_\_\_\_ interference and a decrease in \_\_\_\_\_.
- 46. Is the following sentence true or false? Constructive sound interference is a useful property in antinoise technology. \_\_\_\_\_
- 47. Describe how antinoise technology is used to protect the hearing of jackhammer users.

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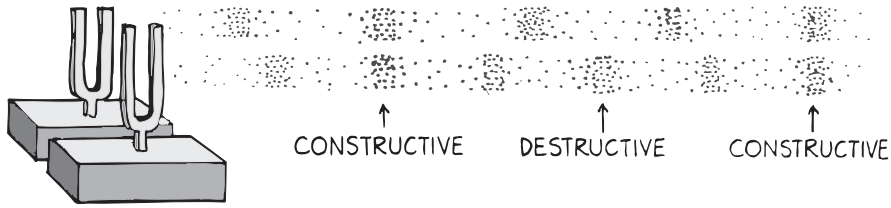


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**26.10 Beats (pages 524–525)**

Use the figure below to answer Questions 48 and 49.



48. Use the figure to explain how beats are formed.

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49. Suppose one tuning fork in the figure vibrates 264 times per second, and the other vibrates 262 times per second.

a. How often are the forks in step? \_\_\_\_\_

b. What is the frequency of beats? \_\_\_\_\_

50. Is the following sentence true or false? If a piano tuner hears beats, the piano is out of tune. \_\_\_\_\_