

Phys.12-Q2W6-H.W.-Sound

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ___ 1. When an air column vibrates in a pipe that is closed at one end,
a. no harmonics are present. c. only even harmonics are present.
b. only odd harmonics are present. d. all harmonics are present.
- ___ 2. The distance between wave fronts of plane waves corresponds to ___ of a sound wave.
a. one compression c. one wavelength
b. two amplitudes d. two rarefactions
- ___ 3. If the intensity of a sound is increased by a factor of 100, the new decibel level will increase
a. by 20 units. c. by a factor of 10.
b. to twice the old one. d. by two units.
- ___ 4. The trough of the sine curve used to represent a sound wave corresponds to
a. a compression. c. the wavelength.
b. a rarefaction. d. the amplitude.
- ___ 5. The point at which a ray crosses a wave front corresponds to a ___ of a sound wave.
a. source c. trough
b. wavelength d. compression
- ___ 6. A train moves down the track toward an observer. The sound from the train, as heard by the observer, is ___ the sound heard by a passenger on the train.
a. a different timbre than c. lower in pitch than
b. higher in pitch than d. the same as
- ___ 7. At a distance of 3 m, the intensity of a sound will be ___ the intensity it was at a distance of 1 m.
a. 9 times c. 3 times
b. one-ninth d. one-third
- ___ 8. For a standing wave in an air column in a pipe that is open at both ends, there must be at least
a. two nodes and one antinode. c. one node and one antinode.
b. two nodes and two antinodes. d. two antinodes and one node.
- ___ 9. When an air column vibrates in a pipe that is open at both ends,
a. only odd harmonics are present. c. all harmonics are present.
b. no harmonics are present. d. only even harmonics are present.
- ___ 10. At a large distance from a sound source, spherical wave fronts are viewed as
a. wavelengths. c. troughs.
b. rays. d. plane waves.
- ___ 11. The wavelength of the fundamental frequency of a vibrating string of length L is
a. L . c. $2L$.
b. $1/2 L$. d. $4L$.
- ___ 12. Of the following materials, sound waves travel fastest through
a. copper at 0°C . c. air at 100°C .
b. helium at 0°C . d. air at 0°C .
- ___ 13. Which of the following is the region of a sound wave in which the density and pressure are greater than normal?
a. amplitude c. wavelength
b. compression d. rarefaction

- ___ 14. The perceived loudness of a sound is measured in
- decibels.
 - hertz.
 - watts per square meter.
 - watts.
- ___ 15. In the figure shown above, a beat occurs at
- t_1 and t_3 .
 - t_1 .
 - t_3 .
 - t_2 .
- ___ 16. Musical instruments of different types playing the same note may often be identified by the ___ of their sounds.
- timbre
 - pitch
 - intensity
 - fundamental frequency
- ___ 17. In general, sound travels faster through
- solids than through gases.
 - empty space than through matter.
 - gases than through liquids.
 - gases than through solids.
- ___ 18. If you are on a train, how will the pitch of the train's whistle sound to you as the train moves?
- The pitch will become steadily lower.
 - The pitch will become steadily higher.
 - The pitch will become higher, then become lower.
 - The pitch will not change.
- ___ 19. The intensity of a sound at any distance from the source is directly proportional to the sound's
- frequency.
 - power.
 - pitch.
 - wavelength.
- ___ 20. If a guitar string has a fundamental frequency of 500 Hz, what is the frequency of its second harmonic?
- 250 Hz
 - 2000 Hz
 - 750 Hz
 - 1000 Hz
- ___ 21. The quality of a musical tone of a certain pitch results from a combination of
- transverse waves.
 - fundamental frequencies.
 - velocities.
 - harmonics.
- ___ 22. The highness or lowness of a sound is perceived as
- wavelength.
 - ultrasound.
 - compression.
 - pitch.
- ___ 23. A vibrating guitar string emits a tone just as a 5.00×10^2 Hz tuning fork is struck. If five beats per second are heard, which of the following is a possible frequency of vibration of the string?
- 605 Hz
 - 2500 Hz
 - 495 Hz
 - 1500 Hz
- ___ 24. Two violin players tuning their instruments together hear 8 beats in 2 s. What is the frequency difference between the two violins?
- 2 Hz
 - 4 Hz
 - 16 Hz
 - 8 Hz
- ___ 25. Which of the following decibel levels is nearest to the value that you would expect for a running vacuum cleaner?
- 120 dB
 - 30 dB
 - 70 dB
 - 10 dB
- ___ 26. Four beats per second are heard when two notes are sounded. The frequency of one note is 420 Hz. Which of the following is a possible frequency of the other note?
- 418 Hz
 - 105 Hz
 - 1680 Hz
 - 416 Hz

Problems

41. An organ tuner is comparing the fundamental pitch from a certain closed-end organ pipe that is 59.9 cm long to the sound from an electronic signal generator set to a pitch of 151 Hz. The pipe is located in an environment in which the speed of sound is 346 m/s. How many beats per second will the organ tuner hear?
- A. 5 beats/s B. 6 beats/s C. 7 beats/s D. 8 beats/s
42. The noise of a certain lawn mower has a power of 0.26 W. At what distance will the intensity of the lawn mower's sound be $7.2 \times 10^{-4} \text{ W/m}^2$?
- A. 5.4 m B. 5.4 m C. 5.4 m D. 5.4 m
43. As two notes are sounded, 9 beats per second are heard. The frequency of one note is 536 Hz. What are the two possible frequencies of the other note?
- A. 507 Hz or 525 Hz B. 527 Hz or 545 Hz
C. 547 Hz or 565 Hz D. 567 Hz or 585 Hz
44. If the intensity of a sound is $5.2 \times 10^{-4} \text{ W/m}^2$ at a distance of 7.3 m, what is the power of the sound?
- A. 0.35 W B. 0.36 W C. 0.37 W D. 0.38 W
5. A wave on a guitar string has a velocity of 626 m/s. The guitar string is 67.4 cm long. What is the fundamental frequency of the vibrating string?
- A. 424 Hz B. 464 Hz C. 484 Hz D. 494 Hz

