

Assessment

Sound**Teacher Notes and Answers****12 Sound****SOUND INTENSITY AND RESONANCE**

1. b
2. d
3. c
4. c
5. b
6. c
7. a
8. d
9. Damage to the ears can result from prolonged exposure to sounds that are not loud enough to cause immediate damage.
10. 19 W
Given
intensity = $4.6 \times 10^{-3} \text{ W/m}^2$
 $r = 18 \text{ m}$
Solution
intensity = $\frac{P}{4\pi r^2}$; $P = 4\pi r^2(\text{intensity})$
 $P = 4\pi(18\text{m})^2(4.6 \times 10^{-3} \text{ W/m}^2) = 19 \text{ W}$

Assessment

Sound**Section Quiz: Sound Intensity and Resonance**

Write the letter of the correct answer in the space provided.

- _____ 1. The measured intensity of sound depends on both the distance from the source and the _____ of the sound source.
- frequency
 - power
 - pitch
 - wavelength
- _____ 2. A sound has an intensity of $1.0 \times 10^{-4} \text{ W/m}^2$ at a distance of 2.0 m from the sound source. What is the intensity at a distance of 4.0 m from the sound source?
- $2.0 \times 10^{-4} \text{ W/m}^2$
 - $1.0 \times 10^{-4} \text{ W/m}^2$
 - $5.0 \times 10^{-5} \text{ W/m}^2$
 - $2.5 \times 10^{-5} \text{ W/m}^2$
- _____ 3. The perceived loudness of a sound is measured in
- watts per square meter.
 - watts.
 - decibels.
 - hertz.
- _____ 4. When the measured intensity of a sound increases from 1.0×10^{-4} to 1.0×10^{-3} , the decibel level increases from 80 dB to
- 800 dB.
 - 100 dB.
 - 90 dB.
 - 70 dB.
- _____ 5. The decibel level at the threshold of human hearing is
- 1 dB.
 - 0 dB.
 - 1 dB.
 - 10 dB.
- _____ 6. In general, the human ear is most sensitive to sounds having a frequency of about
- 20 Hz.
 - 250 Hz.
 - 1000 Hz.
 - 15 000 Hz.

Sound *continued*

- _____ 7. When a string on an acoustic guitar is struck, the hollow body of the guitar vibrates at the same frequency as a result of
- a. forced vibration.
 - b. compressions.
 - c. resonance.
 - d. plane waves.

- _____ 8. Resonance occurs when a force causes an object to vibrate at
- a. a large amplitude.
 - b. a low pitch.
 - c. any frequency.
 - d. its natural frequency.

9. Groundskeepers who mow lawns for several hours a day usually wear ear protectors, even though the loudness of the sound from the mower engine is well below the threshold of pain. Why are they wise to wear the protectors?

10. How much power is given off as sound from a gasoline-powered air compressor if the intensity of the sound is $4.6 \times 10^{-3} \text{ W/m}^2$ at a distance of 18 m?