

CLASS 9

SCIENCE

EXTRA QUESTIONS

Class 9 Science Chapter 10 Sound Waves: Characteristics and Applications – Extra Questions with Answers

Frequency and amplitude tie directly to pitch and loudness in Chapter 10's look at sound as a longitudinal wave, and these extra questions extend that into applications like a bat's use of echolocation.

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Very Short Answer Questions (1 mark)

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Frequency and amplitude tie directly to pitch and loudness in Chapter 10's look at sound as a longitudinal wave, and these extra questions extend that into applications like a bat's use of echolocation.

Very Short Answer Questions (1 mark)

Q1. Is sound a longitudinal or transverse wave?

Ans: Longitudinal wave.

Q2. What is the SI unit of frequency?

Ans: Hertz (Hz).

Q3. What determines the loudness of a sound?

Ans: Amplitude.

Q4. Can sound travel through a vacuum?

Ans: No.

Q5. Name one animal that uses echolocation.

Ans: Bat (dolphin is also acceptable).

Short Answer Questions (2–3 marks)

Q6. Write the relationship between speed, wavelength, and frequency of a sound wave, and explain what each term means.

Ans: Speed = wavelength $\times$ frequency ($v = \lambda f$). Wavelength is the distance between two consecutive compressions or rarefactions; frequency is the number of complete oscillations per second.

Q7. Why does sound travel faster in solids than in gases?

Ans: In solids, particles are much more closely packed than in gases, so vibrations (and the resulting compressions and rarefactions) are transferred from particle to particle much more quickly, resulting in a higher speed of sound.

Q8. Explain the minimum distance required from a reflecting surface for a person to hear a distinct echo, and why this distance matters.

Ans: A reflecting surface needs to be at least about 17 metres away for a person to perceive the reflected sound as a distinct echo (separate from the original sound), because the human ear can only distinguish two sounds as separate if they are at least about 0.1 seconds apart, and this distance ensures that time gap given the speed of sound.

Higher-Order Thinking / Application Questions

Q9. A sound wave has a frequency of 20 Hz and a wavelength of 17 m. Calculate its speed, and identify whether this frequency would typically be audible to humans.

Ans: Speed = wavelength $\times$ frequency = $17 \times 20 = 340$ m/s. A frequency of 20 Hz lies right at the lower edge of the typical human audible range (20 Hz to 20,000 Hz), so it would be just barely audible, often felt more as a low rumble than clearly heard.

Q10. A large empty hall causes speech to sound muddled and hard to understand, but the same hall sounds clear once filled with an audience and soft furnishings. Explain this difference using the concept of reverberation.

Ans: In the empty hall, hard surfaces reflect sound repeatedly, causing many overlapping reflections

(excessive reverberation) that blur and muddle the original sound. When the hall is filled with people and soft furnishings, these materials absorb much of the reflected sound, reducing reverberation and allowing the original, clearer sound to reach listeners with less interference from overlapping echoes.

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