

CLASS 9

SCIENCE

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## NCERT Solutions for Class 9 Science Chapter 10: Sound Waves: Characteristics and Applications – Free PDF Download

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Chapter 10 of Class 9 Science Exploration is Sound Waves: Characteristics and Applications. It explains how sound is produced and travels, the properties used to describe sound waves, and real-world phenomena like echoes and echolocation. These Class 9 Science Chapter 10 solutions are also useful as quick revision n...

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Chapter 10 of Class 9 Science *Exploration* is Sound Waves: Characteristics and Applications. It explains how sound is produced and travels, the properties used to describe sound waves, and real-world phenomena like echoes and echolocation. These Class 9 Science Chapter 10 solutions are also useful as quick revision notes before exams.

## Production and Propagation of Sound

Sound is produced by a **vibrating object**, and travels as a **longitudinal wave** — the particles of the medium vibrate back and forth parallel to the direction the wave travels, creating alternating regions of compression (particles close together) and rarefaction (particles spread apart). Sound needs a material medium to travel and cannot pass through vacuum.

## Characteristics of Sound Waves

**Wavelength** — distance between two consecutive compressions (or rarefactions).

**Frequency** — number of complete oscillations (vibrations) per second, measured in hertz (Hz).

**Time period** — time for one complete oscillation;  $T = 1/\text{frequency}$ .

**Amplitude** — maximum displacement of particles from their rest position; determines loudness.

**Intensity** — amount of sound energy passing through a unit area per second.

**Speed** — distance travelled by the wave per unit time;  $\text{speed} = \text{wavelength} \times \text{frequency}$ .

## Pitch and Loudness

**Pitch** depends on frequency — higher frequency means higher pitch. **Loudness** depends on amplitude — greater amplitude means louder sound.

## Propagation Through Different Media

Sound travels fastest through solids, slower through liquids, and slowest through gases, because particles are more closely packed (allowing faster transfer of vibrations) in solids than in liquids or gases.

## Echo, Reverberation, and Echolocation

**Echo** — a reflected sound heard distinctly after the original, requiring the reflecting surface to be at least about 17 m away (for a detectable time gap).

**Reverberation** — persistence of sound due to repeated, overlapping reflections in an enclosed space, which can make sound muddled if excessive (managed with sound-absorbing materials).

**Echolocation** — the use of reflected sound (echoes) to detect the distance, direction, and nature of objects, used by bats, dolphins, and in technologies like SONAR.

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