NCERT – GRADE 9 CHEAT SHEET

SOUND WAVES: CHARACTERISTICS AND APPLICATIONS

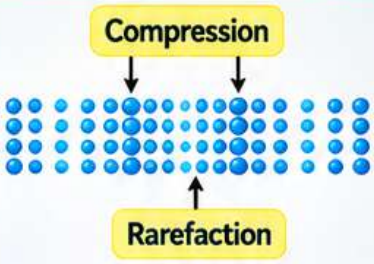
Pumpa

Listen, Learn and Explore the Power of Sound!

Based on NCERT (Exploration – Textbook of Science for Grade 9) | Chapter 10 | Reprint 2026–27 | Pages 184–207

1. What are Sound Waves?

- Sound is a form of energy that travels as waves.
- It is a mechanical wave, which needs a medium (solid, liquid or gas).
- It cannot travel in vacuum.

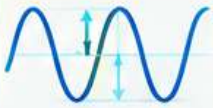


Sound waves are longitudinal waves.

2. Characteristics of Sound Waves

(a) Amplitude

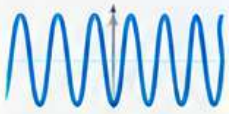
- Related to loudness.



More amplitude → Louder sound

(b) Frequency

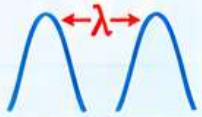
- Related to pitch.



Higher frequency → Higher pitch

(c) Wavelength

- Distance between two successive compressions.



Shorter λ → Higher pitch

3. Speed of Sound

- Speed of sound depends on the medium.
- It is fastest in solids, slower in liquids and slowest in gases.
- In air, its speed is about 340 m/s (at room temperature).

Speed in Different Media



Solid (Metal) ≈ 5000 m/s



Liquid (Water) ≈ 1480 m/s

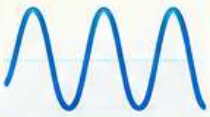


Gas (Air) ≈ 340 m/s

4. Loudness, Pitch and Quality

(a) Loudness

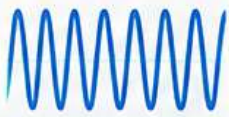
- Depends on amplitude.



More amplitude → Louder sound

(b) Pitch

- Depends on frequency.



Higher frequency → Higher pitch

(c) Quality

- Depends on the waveform.



Lets us identify different sounds.

5. Reflection of Sound

- Sound waves bounce back from surfaces, just like light.
- This is called echo.
- Echo helps us judge distance.



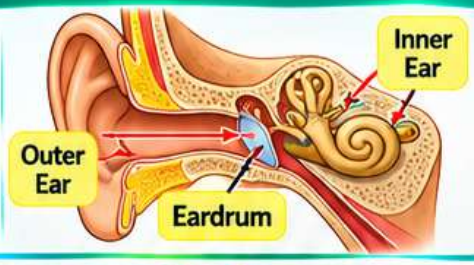
The sound returns after reflection.

6. Applications of Sound

Communication	Navigation	Music
 (Phone)	 (SONAR)	 (Instruments)
Medical Field	**Industry**	**Safety**
 (Ultrasound)	 (Quality Check)	 (Smoke Alarms)

7. Human Ear

- Collects sound waves through the outer ear.
- Eardrum vibrates and transfers vibrations to inner ear.
- Brain interprets the sound.



8. Key Takeaways

- ✓ Sound is a mechanical longitudinal wave.
- ✓ Amplitude → Loudness; Frequency → Pitch.
- ✓ Speed of sound ≈ 340 m/s in air.
- ✓ Sound can be reflected, helping us hear echoes.
- ✓ Sound has many useful applications.

Quick Facts

- Range of human hearing: 20 Hz – 20,000 Hz.
- In solids, sound travels faster than in air.
- SONAR uses sound waves.

Common Mistakes

- ✗ Sound can travel in vacuum (False).
- ✗ Higher pitch means louder sound (False).
- ✗ Speed of sound is same in all media (False).

Key Takeaway

Sound waves around us—listen, explore and learn!

Pumpa | *Sound Waves: Hear the Science in Everyday Life!*