



Class 9 Science Chapter 10 – Important MCQs

Sound Waves: Characteristics and Applications

 **New NCERT *Exploration* | 2026–27**

These MCQs are aligned with the supplied new textbook. Chapter 10 covers **production and propagation of sound, mechanical and longitudinal waves, compressions and rarefactions, wavelength, frequency, time period, amplitude, intensity, speed, pitch, loudness, reflection, echo, reverberation, infrasonic/ultrasonic sound, echolocation and SONAR.**



SECTION A – PRODUCTION & PROPAGATION OF SOUND

1. Sound is produced by:

- A. Light
- B. Vibrations
- C. Heat only
- D. Pressure only

 **Answer: B. Vibrations**

2. Sound is a form of:

- A. Matter
- B. Energy
- C. Force
- D. Mass

 **Answer: B. Energy**

3. Sound waves are generally:

- A. Electromagnetic waves
- B. Mechanical waves
- C. Matter waves
- D. Light waves

 **Answer: B. Mechanical waves**

4. A mechanical wave requires:

- A. Vacuum
- B. A material medium
- C. Light
- D. Electricity

 **Answer: B. A material medium**

5. Sound cannot travel through:

- A. Solids
- B. Liquids
- C. Gases
- D. Vacuum

 **Answer: D. Vacuum**

6. Which statement is correct?

- A. Sound can travel through vacuum.
- B. Sound does not require a medium.
- C. Sound requires a material medium for propagation.
- D. Sound can travel only through air.

 **Answer: C**

7. In a sound wave, particles of the medium:

- A. Travel continuously from source to listener
- B. Vibrate about their mean positions
- C. Remain completely stationary
- D. Move only upward

✓ **Answer: B**



SECTION B – LONGITUDINAL WAVES

8. Sound in air is a:

- A. Transverse wave
- B. Longitudinal wave
- C. Electromagnetic wave
- D. Surface wave

✓ **Answer: B. Longitudinal wave**

9. In a longitudinal wave, particles vibrate:

- A. Perpendicular to wave propagation
- B. Parallel to wave propagation
- C. In circular paths
- D. Randomly

✓ **Answer: B**

The textbook defines sound as a longitudinal wave in which particles vibrate **parallel to the direction of propagation**.

10. The region of high pressure and high density in a sound wave is called:

- A. Rarefaction
- B. Compression
- C. Amplitude
- D. Wavelength

✓ Answer: B. Compression

11. The region of low pressure and low density is called:

- A. Compression
- B. Rarefaction
- C. Crest
- D. Trough

✓ Answer: B. Rarefaction

12. A sound wave consists of alternate:

- A. Crests and troughs
- B. Compressions and rarefactions
- C. Peaks and valleys
- D. Nodes and antinodes

✓ Answer: B

13. During compression, particles of the medium are:

- A. Farther apart
- B. Closer together
- C. Completely stationary
- D. Absent

✓ Answer: B. Closer together



SECTION C – CHARACTERISTICS OF SOUND WAVES

14. The distance between two successive compressions is called:

- A. Amplitude
- B. Frequency
- C. Wavelength
- D. Time period

☒ **Answer: C. Wavelength**

15. Wavelength is represented by:

- A. f
- B. T
- C. λ
- D. A

☒ **Answer: C. λ**

16. The SI unit of wavelength is:

- A. Hertz
- B. Metre
- C. Second
- D. Decibel

☒ **Answer: B. Metre**

17. Frequency is the number of:

- A. Waves travelling per metre
- B. Complete vibrations per second
- C. Seconds per vibration
- D. Compressions per metre

☒ **Answer: B**

18. The SI unit of frequency is:

- A. Metre
- B. Second

- C. Hertz
- D. Joule

✓ Answer: C. Hertz (Hz)

19. A source makes 20 vibrations in 4 seconds. Its frequency is:

- A. 4 Hz
- B. 5 Hz
- C. 20 Hz
- D. 80 Hz

✓ Answer: B. 5 Hz

f = Number of vibrations / Time

$$f = 20 / 4 = 5 \text{ Hz}$$

20. The time taken to complete one vibration is called:

- A. Frequency
- B. Wavelength
- C. Time period
- D. Amplitude

✓ Answer: C. Time period

21. The relation between frequency and time period is:

- A. $T = f$
- B. $T = 1/f$
- C. $T = f^2$
- D. $T = 2f$

✓ Answer: B. $T = 1/f$

22. If the frequency of a wave is 50 Hz, its time period is:

- A. 50 s
- B. 0.5 s
- C. 0.02 s
- D. 2 s

✓ Answer: C. 0.02 s

$$T = 1/f = 1/50 = 0.02 \text{ s}$$

23. Amplitude is the:

- A. Number of vibrations per second
- B. Maximum displacement from the mean position
- C. Distance travelled in one second
- D. Distance between two compressions

✓ Answer: B

24. Increasing the amplitude of a sound wave generally makes the sound:

- A. Higher in pitch
- B. Louder
- C. Lower in pitch
- D. Slower

✓ Answer: B. Louder

25. The characteristic mainly associated with the frequency of sound is:

- A. Loudness
- B. Pitch
- C. Intensity
- D. Speed

✓ Answer: B. Pitch

26. A high-frequency sound has:

- A. High pitch
- B. Low pitch
- C. No pitch
- D. Low amplitude necessarily

✓ Answer: A. High pitch

27. A low-frequency sound has:

- A. High pitch
- B. Low pitch
- C. High intensity necessarily
- D. Maximum amplitude

✓ Answer: B. Low pitch

28. Loudness is mainly related to:

- A. Frequency
- B. Amplitude/intensity
- C. Wavelength only
- D. Speed only

✓ Answer: B

SECTION D – SPEED OF SOUND

29. The speed of a wave is related to frequency and wavelength by:

- A. $v = f + \lambda$
- B. $v = f/\lambda$
- C. $v = f \times \lambda$
- D. $v = \lambda/f$

✓ Answer: C. $v = f \times \lambda$

30. If frequency is 100 Hz and wavelength is 2 m, the speed is:

- A. 50 m/s
- B. 100 m/s
- C. 200 m/s
- D. 300 m/s

 **Answer: C. 200 m/s**

$$v = f \times \lambda = 100 \times 2 = 200 \text{ m/s}$$

31. Sound travels fastest through:

- A. Gases
- B. Liquids
- C. Solids
- D. Vacuum

 **Answer: C. Solids**

32. Sound generally travels slowest through:

- A. Solids
- B. Liquids
- C. Gases
- D. Metals

 **Answer: C. Gases**

33. Which statement is correct?

- A. Sound always travels at the same speed in all media.
- B. Speed of sound depends on the medium.
- C. Sound travels fastest in vacuum.
- D. Sound cannot travel through liquids.

 **Answer: B**



SECTION E – HUMAN HEARING

34. The normal audible range for humans is approximately:

- A. 2 Hz to 200 Hz
- B. 20 Hz to 20,000 Hz
- C. 200 Hz to 2,000 Hz
- D. 20,000 Hz to 40,000 Hz

☒ **Answer: B. 20 Hz to 20,000 Hz**

35. Sound below 20 Hz is called:

- A. Ultrasonic sound
- B. Infrasonic sound
- C. Audible sound
- D. Supersonic sound

☒ **Answer: B. Infrasonic sound**

36. Sound above 20,000 Hz is called:

- A. Infrasonic sound
- B. Audible sound
- C. Ultrasonic sound
- D. Subsonic sound

☒ **Answer: C. Ultrasonic sound**

37. Which animal is well known for using ultrasonic sounds for echolocation?

- A. Bat
- B. Cow
- C. Elephant
- D. Horse

☒ **Answer: A. Bat**

38. Elephants can produce sounds that include:

- A. Only ultrasonic sounds
- B. Infrasonic sounds
- C. Only audible sounds
- D. No sound

 **Answer: B. Infrasonic sounds**



SECTION F – REFLECTION OF SOUND

39. The bouncing back of sound after striking a surface is called:

- A. Refraction
- B. Reflection
- C. Diffusion
- D. Absorption

 **Answer: B. Reflection**

40. A smooth, hard surface is generally a good:

- A. Absorber of sound
- B. Reflector of sound
- C. Producer of sound
- D. Source of ultrasound

 **Answer: B. Reflector of sound**

41. Which surface generally reflects sound better?

- A. Thick curtain
- B. Foam
- C. Soft carpet
- D. Hard wall

✓ Answer: D. Hard wall

42. An echo is produced due to:

- A. Refraction of sound
- B. Reflection of sound
- C. Absorption of sound
- D. Production of ultrasound

✓ Answer: B. Reflection of sound

43. For a distinct echo to be heard, the reflected sound should reach the listener after approximately:

- A. 0.001 s
- B. 0.01 s
- C. 0.1 s or more
- D. 10 s

✓ Answer: C. 0.1 s or more

44. If reflected sound reaches the ear after 0.05 s, it is generally heard as:

- A. A distinct echo
- B. Reverberation
- C. Ultrasound
- D. Infrasound

✓ Answer: B. Reverberation

The textbook includes the 0.05 s case as an application question on distinguishing echo from reverberation.

45. Persistence of sound due to repeated reflections is called:

- A. Echo
- B. Reverberation

- C. Resonance
- D. Refraction

✓ **Answer: B. Reverberation**



SECTION G – ECHOLOCATION & SONAR

46. Echolocation is based on:

- A. Absorption of sound
- B. Reflection of sound
- C. Refraction of light
- D. Production of heat

✓ **Answer: B. Reflection of sound**

47. Animals that commonly use echolocation include:

- A. Bats and dolphins
- B. Cows and horses
- C. Elephants and cows only
- D. Humans only

✓ **Answer: A**

48. SONAR stands for:

- A. Sound Navigation and Ranging
- B. Sound Nuclear Radiation
- C. Sonic Navigation and Reflection
- D. Sound Network and Resonance

✓ **Answer: A. Sound Navigation and Ranging**

49. SONAR commonly uses:

- A. Infrasonic waves
- B. Ultrasonic waves
- C. Radio waves
- D. Visible light

✓ **Answer: B. Ultrasonic waves**

50. SONAR is used to determine:

- A. Depth of oceans
- B. Colour of seawater
- C. Temperature of stars
- D. Atmospheric pressure only

✓ **Answer: A**

51. SONAR can help locate:

- A. Underwater objects
- B. Clouds only
- C. Birds in air only
- D. Stars

✓ **Answer: A. Underwater objects**

The textbook explains that SONAR sends ultrasonic waves into water and analyses the reflected waves to determine the **distance, direction and speed** of underwater objects.



SECTION H – APPLICATIONS OF ULTRASOUND

52. Ultrasound is used medically for:

- A. Imaging and diagnosis
- B. Producing sunlight

- C. Measuring atmospheric oxygen
- D. Making metals magnetic

✓ Answer: A

53. Ultrasound can be used for:

- A. Medical diagnosis
- B. Industrial cleaning
- C. Detecting underwater objects
- D. All of these

✓ Answer: D. All of these

54. Ultrasonic waves are useful for industrial:

- A. Cleaning and testing
- B. Photosynthesis
- C. Digestion
- D. Evaporation only

✓ Answer: A



SECTION I – NUMERICAL MCQs

55. A sound wave has frequency 200 Hz and wavelength 1.5 m. Its speed is:

- A. 100 m/s
- B. 200 m/s
- C. 300 m/s
- D. 400 m/s

✓ Answer: C. 300 m/s

$$v = f \times \lambda$$

$$v = 200 \times 1.5 = 300 \text{ m/s}$$

56. A sound wave travels at 340 m/s with a frequency of 170 Hz. Its wavelength is:

- A. 0.5 m
- B. 1 m
- C. 2 m
- D. 4 m

 **Answer: C. 2 m**

$$\lambda = v/f = 340/170 = 2 \text{ m}$$

57. A sound source has a frequency of 250 Hz. Its time period is:

- A. 0.004 s
- B. 0.04 s
- C. 4 s
- D. 250 s

 **Answer: A. 0.004 s**

$$T = 1/f = 1/250 = 0.004 \text{ s}$$

58. A sonar signal takes 4 s to return after being sent into seawater. If the speed of sound is 1500 m/s, the depth is:

- A. 1500 m
- B. 3000 m
- C. 6000 m
- D. 750 m

 **Answer: B. 3000 m**

$$\text{Depth} = v \times t / 2$$

$$= 1500 \times 4 / 2 = 3000 \text{ m}$$

59. A sonar signal returns after 0.90 s in seawater where sound travels at 1530 m/s. The distance of the object is:

- A. 344.25 m
- B. 688.5 m
- C. 1377 m
- D. 1530 m

✓ **Answer: B. 688.5 m**

Distance = $1530 \times 0.90 / 2 = 688.5$ m

This is the same type of calculation given in the textbook's SONAR example.



SECTION J – HIGHER-ORDER MCQs

60. Two sounds have the same amplitude but different frequencies. They will mainly differ in:

- A. Pitch
- B. Loudness
- C. Speed in the same medium
- D. Energy only

✓ **Answer: A. Pitch**

61. Two sounds have the same frequency but different amplitudes. They mainly differ in:

- A. Pitch
- B. Loudness
- C. Wavelength in the same medium
- D. Time period

✓ **Answer: B. Loudness**

62. If the frequency of a sound wave increases while its speed remains constant, its wavelength:

- A. Increases
- B. Decreases
- C. Remains unchanged
- D. Becomes zero

✓ **Answer: B. Decreases**

Because:

$$v = f \times \lambda$$

63. A sound wave has a higher frequency than another sound wave. It has:

- A. Higher pitch
- B. Lower pitch
- C. Always greater amplitude
- D. Always greater speed

✓ **Answer: A. Higher pitch**

64. A louder sound generally has:

- A. Greater amplitude
- B. Lower frequency
- C. Greater wavelength necessarily
- D. Lower speed

✓ **Answer: A. Greater amplitude**

65. Astronauts in space cannot normally hear each other directly through the vacuum because:

- A. Sound is too slow
- B. Sound requires a material medium
- C. Sound has no energy
- D. Sound has no frequency

✓ Answer: B

66. Light from an explosion in space can reach an observer, but sound cannot because:

- A. Light requires air but sound does not
- B. Light can travel through vacuum, while sound requires a medium
- C. Sound is electromagnetic
- D. Light is mechanical

✓ Answer: B

The textbook explicitly contrasts mechanical waves such as sound, which require a medium, with light, which can travel through vacuum.

67. If the amplitude of a sound wave is increased, its:

- A. Pitch necessarily increases
- B. Loudness generally increases
- C. Frequency necessarily increases
- D. Speed necessarily increases

✓ Answer: B

68. If 20 compressions pass a point in 4 seconds, the frequency is:

- A. 80 Hz
- B. 5 Hz
- C. 10 Hz
- D. 0.2 Hz

✓ Answer: B. 5 Hz

This is also directly reflected in the textbook's Chapter 10 practice questions.

69. A sound wave has wavelength 3.44 m and speed 344 m/s. Its time period is:

- A. 0.001 s
- B. 0.01 s
- C. 0.1 s
- D. 1 s

✓ **Answer: C. 0.01 s**

First:

$$f = v/\lambda = 344/3.44 = 100 \text{ Hz}$$

Therefore:

$$T = 1/100 = 0.01 \text{ s}$$

70. Which combination is correct?

- A. Frequency → loudness; amplitude → pitch
- B. Frequency → pitch; amplitude → loudness
- C. Frequency → speed; amplitude → wavelength
- D. Frequency → echo; amplitude → SONAR

✓ **Answer: B**



QUICK ANSWER KEY

Q	Ans.	Q	Ans.	Q	Ans.	Q	Ans.
1	B	19	B	37	A	55	C
2	B	20	C	38	B	56	C
3	B	21	B	39	B	57	A
4	B	22	C	40	B	58	B
5	D	23	B	41	D	59	B
6	C	24	B	42	B	60	A
7	B	25	B	43	C	61	B

8	B	26	A	44	B	62	B
9	B	27	B	45	B	63	A
10	B	28	B	46	B	64	A
11	B	29	C	47	A	65	B
12	B	30	C	48	A	66	B
13	B	31	C	49	B	67	B
14	C	32	C	50	A	68	B
15	C	33	B	51	A	69	B
16	B	34	B	52	A	70	B
17	B	35	B	53	D		
18	C	36	C	54	A		

MUST-REMEMBER FORMULAS

Wave Speed

$$v = f \times \lambda$$

Frequency

$$f = \text{Number of vibrations} / \text{Time}$$

Time Period

$$T = 1/f$$

Wavelength

$$\lambda = v/f$$

Echo / SONAR Distance

$$\text{Distance} = \text{Speed} \times \text{Time} / 2$$

The division by **2** is necessary because the measured time is for the sound to travel **to the object and back**.

HIGHEST-PRIORITY REVISION

-  **Sound is produced by vibrations**
-  **Sound is a mechanical longitudinal wave**
-  **Compression and rarefaction**
-  **Wavelength (λ)**
-  **Frequency (f)**
-  **Time period (T)**
-  **Amplitude (A)**
-  **Speed of sound**
-  **Pitch $\rightarrow$ frequency**
-  **Loudness $\rightarrow$ amplitude/intensity**
-  **Human audible range**
-  **Reflection of sound**
-  **Echo and reverberation**
-  **Echolocation**
-  **SONAR**
-  **Medical and industrial ultrasound applications**

The supplied textbook specifically includes numerical questions on **frequency, wavelength, time period, echo and SONAR**, so these are especially important for exam preparation.