



# PHYSICS

## BOOKS - CHETANA PUBLICATION

### Study of Sound

#### Example

1. How does the velocity of sound depend on its frequency?



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2. How is the direction of the oscillation of the particles of the medium related to the direction of propagation of the sound wave?



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3. Find the odd one out:

Bats, rats, cats, dolphins



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4. Find the odd one out:

Clothes, paper, curtains, mirror



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5. Find the odd one out:

Submarines, icebergs, internal organ, sunken ships.



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**6. Find the odd one out:**

Temperature, density, molecular weight,  
pressure



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**7. How can one produce sound?**



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**8. What is velocity of sound wave ?**



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9. What is the minimum distance of the reflecting surface to hear an echo ?



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10. Match the columns:

Column 'A'	Column 'B'	Column 'C'
(1) Transverse wave	(a) Particles oscillate parallel to direction of propagation	(i) Wave produced in a slinky
(2) Longitudinal wave	(b) Particles oscillate perpendicular to direction of propagation	(ii) Frequency less than 20 Hz
(3) Ultrasound	(c) Echo formation is heard under particular conditions	(iii) Wave produced in string
(4) Infrasound	(d) High frequency waves	(iv) Frequency between 20 Hz to 20000 Hz
(5) Audible frequency	(e) Low frequency waves	(v) Frequency greater than 20000 Hz



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## 11. Match the columns:

Column 'A'	Column 'B'	Column 'C'
(1) Amplitude	(a) T	(i) Pitch of sound
(2) Frequency	(b) A	(ii) Loudness of sound
(3) Wavelength	(c) $\lambda$	(iii) Reciprocal of frequency
(4) Time period	(d) $\lambda$	(iv) $v/\nu$



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12. A form of energy which produces sensation of hearing in our ears.



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**13.** Repetitions of sound due to reflection .



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**14.** The audible range of sound for human being.



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**15.** A method to obtain images of internal organs of the human body.





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**16.** The matter or substance through which sound gets transmitted.



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**17.** Three major parts of the ear.



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**18.** Any two examples in which infrasound is produced.



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**19.** Name the living beings that can produce ultrasound.



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**20.** The roof of a movie theatre and a conference hall is curved.



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**21.** The intensity of reverberation is higher in a closed and empty house.



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**22.** We cannot hear the echo produced in a classroom.



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**23.** Bats can navigate in dark.



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**24.** A SONAR system is installed in a ship.



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**25.** Sound travels faster in iron than in air.



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**26.** Nita heard the sound of lightning after 4 seconds of seeing it. What was the distance of the lightning from her?

(The velocity of sound in air is  $340m / s$ )



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**27.** Ultrasonic waves are transmitted downwards into the sea with the help of a SONAR. The reflected sound is received after 4 s. What is the depth of the sea at that place?

(Velocity of sound in seawater =  $1550\text{m} / \text{s}$ )



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**28.** A person standing near a hill fires a gun and hears the echo after 1 second. If speed of sound in air is  $340\text{m} / \text{s}$ . Find the distance between the hill and the person.



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**29.** Sunil is standing between two walls. The wall closest to him is at a distance of 660 m. If he shouts, he hear the first echo after 4 s and another after another 2 seconds.

What is the velocity of sound in air?



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**30.** Sunil is standing between two walls. The wall closest to him is at a distance of 660 m. If he shouts, he hear the first echo after 4 s and another after another 2 seconds.

What is the distance between the two walls?



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**31.** If you hear the thunder 20 seconds after you see the flash of lightning, how far from

you hasthe lightning occurred? (Speed of sound in air =  $340\frac{m}{s}$ )



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**32.** Aboy observes smoke from a cannon 3seconds before he hears the bang. If the cannon is 1020 m from the observer, find the velocity of sound.



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**33.** A man fires a gun. He heard the echo of the sound from the first building after 2 seconds and echo from the second building after 3 seconds. Find the distance between two buildings. (Speed of sound in air =  $340 \frac{m}{s}$ )



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**34.** Sound waves of wavelength 1 cm have a velocity of 340 m/s in air. What is their

frequency? Can this sound be heard by the human ear?



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**35.** How long will it take for a sound wave of 25 cm wavelength and 1.5 kHz frequency, to travel a distance of 1.5 km?



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**36.** Calculate distance travelled by a sound wave having frequency 1000 Hz and wavelength 0.25 m, if it travels for 5 seconds in a certain medium.



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**37.** The audible range of sound is 20 Hz to 20000 Hz. At  $22^{\circ}C$  in airspeed of sound is  $344m/s$ . Express the range of sound in terms

of wavelength by calculating the respective values.



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**38.** A sound wave has frequency 320 Hz and wavelength 0.25 m. How much distance will it travel in 10 second?



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**39.** The molecular weight of oxygen gas ( $O_2$ ) is 32 while that of hydrogen gas ( $H_2$ ) is 2. Prove that under the same physical conditions, the velocity of sound in hydrogen is four times that in oxygen.



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**40.** Hydrogen gas is filled in two identical bottles, A and B, at the same temperature. The mass of hydrogen in the two bottles is 12 gm

and 48 gm respectively. In which bottle will sound travel faster? How many times as fast as the other?



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**41.** Helium gas is filled in two identical bottles A and B. The mass of the gas in the two bottles is 10 gm and 40 gm respectively. If the speed of sound is the same in both bottles, what conclusions will you draw?



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**42.** Hydrogen gas is filled in two identical bottles, A and B, at the same temperature. The mass of hydrogen in the two bottles is 10 gm and 90gm respectively. In which bottle will sound travel faster? How many times as fast as the other?



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**43.** Argon gas is filled in two identical bottles X and Y. The mass of the gas in the two bottles

is 5 gm and 25gm respectively. If the speed of sound is the same in both bottles, what conclusions will you draw?



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**44.** The speed of sound in air at  $0^{\circ}C$  is  $332m/s$ . If it increases at the rate of  $0. m/s$  per degree, what will be the temperature when the velocity has increased to  $344m/s$ ?



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**45.** Velocity of sound in air at  $0^{\circ}\text{C}$  is  $332\text{m/s}$ . It increases by  $0.6\text{m/s}$  for each  $^{\circ}\text{C}$  rise in temperature. At what temperature of air, the velocity will be  $359\text{m/s}$ ?



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**46.** Velocity of sound in air at  $0^{\circ}\text{C}$  is  $332\text{m/s}$ . It increases by  $0.6\text{m/s}$  for each degree Celsius rise in temperature. What will be the velocity of sound at  $60^{\circ}\text{C}$ ?



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**47.** Define the following:

Wavelength ( $\lambda$ )



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**48.** Define the following:

Amplitude (A)



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**49.** Define the following:

Frequency ( $\nu$ )



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**50.** Define the following:

Time Period (T)



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**51. Define the following:**

Echo



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**52. Define the following:**

Transverse waves



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**53.** Define the following:

Longitudinal waves



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**54.** Define the following:

Velocity of wave



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**55.** Distinguish between:

Infrasound and Ultrasound



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**56.** Distinguish between:

Transverse waves and Longitudinal waves



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**57.** How will you reduce reverberation in public halls or buildings?



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**58.** How is ultrasound used in medical science?



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**59.** Answer the following questions:

Study the construction of the Golghumat at

Vijapur and discuss the reasons for the multiple echoes produced there.



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**60.** What should be the dimensions and the shape of classrooms so that no echo can be produced there?



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**61.** Consider two cases

(A) whistle of train (B) roar of a lion

In which case the sound is high pitch?



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**62.** Consider two cases

(A) whistle of train (B) roar of a lion

What is the real cause of sound production?

Explain with examples.



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**63.** Consider two cases

(A) whistle of train (B) roar of a lion

Three sounds 5 Hz, 500 Hz and 50,00 Hz are produced by different sources.

Which sound will be heard by humans?



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**64.** Consider two cases

(A) whistle of train (B) roar of a lion

Three sounds 5 Hz, 500 Hz and 50,00 Hz are

produced by different sources.

Which sounds may be produced by bats?



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**65.** Consider two cases

(A) whistle of train (B) roar of a lion

Three sounds 5 Hz, 500 Hz and 50,00 Hz are produced by different sources.

Which sounds may be produced by elephants?



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**66.** Suppose you and your friend are on the moon. Will you be able to hear any sound



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**67.** To hear the echo distinctly, will the distance from the source of sound to the reflecting surface be same at all temperatures? Explain your answer.



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**68.** When is the reflection of sound harmful?



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**69.** What kind of waves are created when a stone is dropped in water ?



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**70.** How are the frequencies of notes sa, re, ga, ma, pa, dha, ni related to each other?



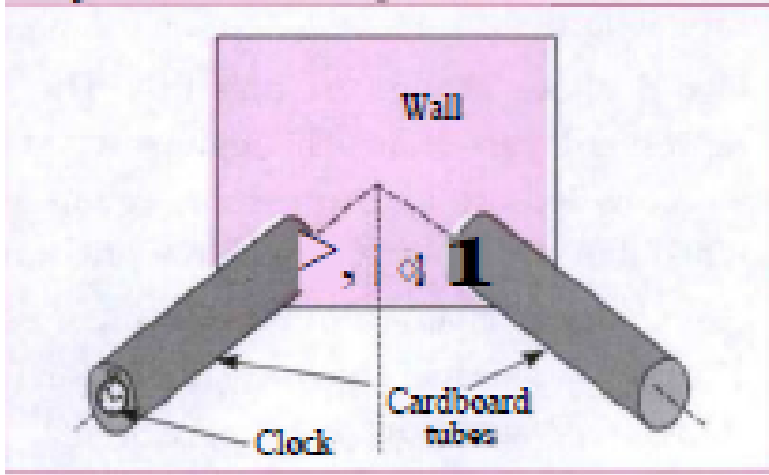
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**71.** What is the main difference between the frequencies of the voice of a man and that of a woman?



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**72.** In the above activity, what will happen if you lift one of the tubes to some height?



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**73.** Measure the angle of incidence  $\theta_1$  and the angle of reflection  $\theta_2$ . Try to see if they are related in any way.



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**74.** What is an echo? What factors are important to get a distinct echo?



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**75.** Where and why are sound absorbing materials used?



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**76.** What are the factors on which velocity of sound in gaseous medium depend?



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**77.** what are the uses of ultrasonic sound?



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**78.** Explain with the help of a neat labelled diagram the working of human ear.



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**79.** Write in short note on SONAR?



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**80.** Write short note on Sonography. How is it misused.



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1. The unit of frequency is .....

A. Hertz

B.  $m / s^2$

C. Decibels

D.  $m / s$

**Answer:**



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2. The normal hearing range for humans is

..... .

A. 0 Hz to 20 Hz

B. greater than 20,000 Hz

C. 20 Hz to 20,000 Hz

D. none of these

**Answer:**



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3. Sound will not travel through .....

A. Vacuum

B. Liquid

C. Solid

D. Gases

**Answer:**



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4. SI unit of .....is Hertz (Hz).

A. Wavelength

B. Frequency

C. Speed of wave

D. Velocity

**Answer:**



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5. The velocity of sound is inversely proportional to the..... .

A. Pressure

B. Square root of temperature

C. Square root of density

D. Humidity

**Answer:**



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6. Sound waves with frequency greater than 20 kHz are called..... .

A. Infrasound

B. Ultrasound

C. Sonic

D. Damped sound

**Answer:**



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7. The loudness of a sound depends upon

..... .



A. Amplitude

B. Speed

C. Density

D. Wavelength

**Answer:**



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**8. .... / ... are used in sonography.**

A. High frequency ultrasound

B. Stationary waves

C. High frequency infrasound

D. High frequency micro waves

**Answer:**



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9. The .....receives the vibrations coming from the membrane and converts them into electrical signals which are sent to the brain through the nerve.

A. Cochlea

B. Tympanic cavity

C. Stapes

D. Pinna

**Answer:**



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**10. Sound will not travel through ..... .**

A. vacuum

B. liquid

C. solid

D. gases

**Answer:**



**Watch Video Solution**

**11.** SI unit of .....is Hertz (Hz).

A. wavelength

B. speed

C. speed of wave

D. velocity

**Answer:**



**Watch Video Solution**

**12.** The loudness of a sound depends upon

..... .

A. amplitude

B. speed

C. density

D. wavelength

**Answer:**



**Watch Video Solution**

**13.** .....are used in sonography.

A. High frequency ultrasound

B. Stationary waves

C. High frequency infrasound

## D. High frequency micro waves

**Answer:**



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**14. Match the columns:**

Column 'A'	Column 'B'
(1) Frequency	(a) $\nu$
(2) Wavelength	(b) $\lambda$



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**15.** The intensity of reverberation is higher in a closed and empty house.



**Watch Video Solution**

**16.** Bats can navigate in dark.



**Watch Video Solution**

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**Watch Video Solution**

**26.** What are the uses of ultrasonic sound?



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