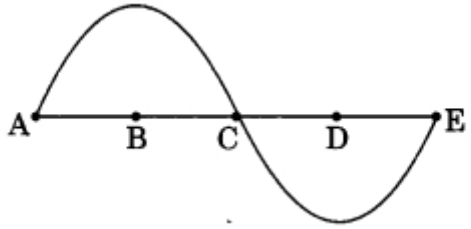
INDIAN SCHOOL AL WADI AL KABIR		
Class: IX	**Department: SCIENCE** **Subject: Physics**	**Date: 03.02.2025**
Worksheet No.: 5 with answers	**Topic: SOUND**	**Note: A4 FILE FORMAT**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

MULTIPLE CHOICE QUESTIONS (1 MARK)

1. In the curve half the wavelength is



(a) AB (b) BD (c)DE (d) AE

2. To hear a distinct echo each time interval between the original sound and the reflected sound must be:
   (a) 0.2 s (b) 1s
   (c) 2s (d) 0.1 s
3. Speed (v) , wavelength(λ) and the frequency (ν) of sound are related as
   (a) λ= v × ν (b) v= λ × ν
   (c) ν = λ × v (d) v= λ / ν
4. A wave in slinky travelled to and fro in 5 sec the length of the slinky is 5m. What is the velocity of wave?
   (a) 10m/s (b) 5m/s
   (c) 2m/s (d) 25m/s
5. Which characteristic is this? We can distinguish between sound having same pitch and loudness.
   (a) Tone (b) Note
   (c) Pitch (d) Timber
6. When the vibrating object moves backwards, it creates a region of low pressure called
   (a) Refraction
   (b) Reflection
   (c) Rarefaction
   (d) Retardation
7. The distance which compression or a rarefaction travels per unit of time gives————-
   (a) The density of sound wave
   (b) Speed of sound

(c) Wavelength of sound
(d) Frequency of sound

8. Sound travels through which medium?

(a) Solid (b) Liquid (c) Gas (d) All the above

9. Sound travels fastest through which medium.

(a) Gas (b)Liquid (c)Solid (d) All of the above

10. When a body vibrates, it compresses the air surrounding and forms a high-density area known as

(a) Refraction
(b) Reflection
(c) Rarefaction
(d) Compression

11. The phenomenon where a sound produced is heard again due to reflection is called ------

(a) Sound bounce
(b) Mirage
(c) An echo
(d) Interference

12. Sound waves in air is an example of ———————— .

(a) Longitudinal wave
(b) Transverse wave
(c) Electromagnetic wave
(d) None of the options

13. The number of compressions or rarefactions per unit time gives ————

(a) Wavelength
(b) Time period
(c) Amplitude
(d) Frequency.

ASSERTION-REASONING QUESTIONS

For the following questions, two statements are given-one labelled Assertion (A) and the other labelled Reason(R). Select the correct answer to these questions from the options (a) , (b), (c) and (d)as given below:

(a) Both A and R are true and R is the correct explanation of the Assertion.
(b) Both A and R are true but R is not the correct explanation of the Assertion.
(c) A is true but R is false.
(d) A is false but R is true.

14. Assertion: Two persons on the surface of moon cannot talk to each other.
Reason: There is no atmosphere on moon.

15. Assertion: Compression and rarefaction involve changes in density and pressure.
Reason: When particles are compressed, density of medium increases and when they are rarefied, density of medium decreases.

16. Assertion: The sound of the human voice is produced due to vibrations in the vocal cords.
Reason: Vibration means a kind of rapid to and fro motion of an object.

17. Assertion: Pitch of a note depends upon its wavelength.
    Reason: Sound cannot travel through vacuum.
18. Assertion: Audible sound lies in the range of 20 to 200 Hz.
    Reason: Infrasonic sound or Infra-sound has frequency less than 20 Hz.

SHORT ANSWER QUESTIONS (2 MARKS)

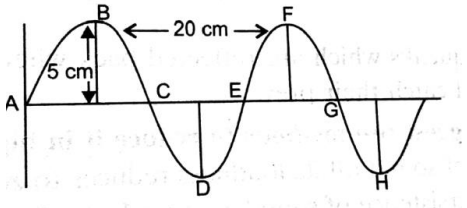
19. (a) Why sound waves are called mechanical waves?
    (b)A baby recognizes her mother by her voice. Name the characteristic of sound involved.
20. If 20 waves are produced per second, what is the frequency in Hertz?
    What is the frequency of wave with time period 0.025s?
21. Distinguish between transverse waves and longitudinal waves. Give one example each of transverse and longitudinal wave.
22. A wave is moving in air with a velocity of 340m/s. Calculate the wavelength if its frequency is 512Hz. ($\lambda = v/\nu = 0.66$m)
23. Sound of explosions taking place on planets is not heard by a person on the earth. Give reason.

SHORT ANSWER QUESTIONS (3 MARKS)

24. (a) A stone is thrown in a pond. 12 full ripples are produced in 1 second. .If the distance between a crest and a trough is 10cm, calculate the wavelength and velocity of the wave.
    (b) What happens to the speed of sound on a hotter day?
25. (a)Why are ceilings of concert halls and conference halls made curved? Ans. Curved ceilings reflect the sound and spread it evenly across the width of the hall.
    (b) Why are the roofs and the walls of the auditoriums covered with sound absorbent materials?
    (c)What is an Echo? State two necessary conditions for echo to be heard. Bats cannot see still they catch their prey. Explain.

LONG ANSWER QUESTIONS

26. State the relationship between frequency and time period of a wave. The wavelength of vibrations produced on the surface of water is 2 cm. If the wave velocity is 16 m/s find its frequency and time period.
27. (a) Draw diagrams showing soft and loud sound.
    (b) In an orchestra, different musical instruments produce their own sounds. Do these sounds reach us with the same speed? Give reason.
28. On a cloudy day, a thunder was heard 14 s after the lightning was seen. How far away was the cloud? The speed of sound = 340 m/s.
29.



Waves of frequency 100 Hz are produced in a string as shown in the figure.
Give its (i) Amplitude (ii) Wave length and (iii) velocity

CASE STUDY BASED QUESTIONS

30. Sound bounces off a solid or a liquid like a rubber ball bounce off a wall. Like the light, sound gets reflected at the surface of a solid or liquid and follows the same laws of reflection. The directions in which the sound is incident and is reflected make equal angles with the normal to the reflecting surface at the point of incidence, and the three are in the same plane. If we clap near a suitable reflecting object such as a tall building or a mountain, we will hear the same sound again a little later. This sound that we hear is called an echo. To hear a distinct echo the time interval between the original sound and the reflected one must be at least 0.1s. Hence, for hearing distinct echoes, the minimum distance of the obstacle from the source of sound must be 17.2 m. This distance will change with the temperature of air. Another phenomenon of reflection of sound is reverberation. A sound created in a big hall will persist by repeated reflection from the walls until it is reduced to a value where it is no longer audible. The repeated reflection that results in this persistence of sound is called reverberation. Excessive reverberation is highly undesirable.

(a)What is persistence of hearing?
(b)What causes the rolling sound of thunder?
(c)State the two laws of reflection of sound

OR

What are the methods of reducing reverberation?

31. Sound is produced by vibrating objects. The matter or substance through which sound is transmitted is called a medium. It can be solid, liquid or gas. Sound moves through a medium from the point of generation to the listener. When an object vibrates, it sets the particles of the medium around it vibrating. The particles do not travel all the way from the vibrating object to the ear. Sound waves are characterized by the motion of particles in the medium and are called mechanical waves. When a vibrating object moves forward, it pushes and compresses the air in front of it creating a region of high pressure; this region is called a compression(C).When the vibrating object moves backwards, it creates a region of low pressure called rarefaction (R). Hence sound is longitudinal wave.

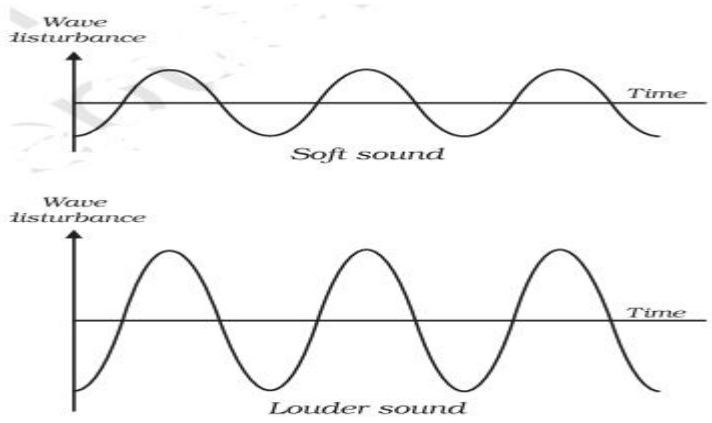
(a)Why sound wave is called as longitudinal wave?
(b)What gets transmitted from one point to another when sound travels through a medium?
(c)What is sound and how is it propagated?

OR

Define compressions and rarefactions.

Q. No.	ANSWERS
1.	(b) BD
2.	(d) 0.1 s
3.	(b) $v = \lambda \times \nu$
4.	(c) 2m/s

5.	(d) Timber
6.	(c) Rarefaction **Explanation:** Rarefaction is the opposite of compression. Rarefaction means the reduction of density of the object.
7.	(b) speed of sound **Explanation:** Speed of sound measures the compression or a rarefaction that travels per unit of time.
8.	(d) All of these **Explanation:** Sound has the ability to travel through solid, liquid and gas.
9.	(c) solid
10.	(d)Compression **Explanation:** Compression is the opposite of rarefaction. Compression means increase in the density of the object.
11.	(c)An echo. **Explanation:** To hear a distinct echo sound, the time interval between original and reflected sound must be at least 0.1s.
12.	(b) Longitudinal wave **Explanation:** In longitudinal waves, particles travel parallel to the direction of wave motion employing successive compressions or elongations.
13.	(d) Frequency **Explanation:** The number of compressions or rarefactions per unit time defines pitch. The pitch is directly proportional to frequency
14.	(a)Both A and R are true and R is the correct explanation of the Assertion.
15.	(a)Both A and R are true and R is the correct explanation of the Assertion.
16.	(b)Both A and R are true but R is not the correct explanation of the Assertion.
17.	(d)A is false but R is true.
18.	(d)A is false but R is true.
	SHORT ASWER QUESTIONS (2 MARK)
19	Because sound requires a material medium for propagation.
	Timbre / Quality.
20	20 Hertz Frequency = 1/Time period = 1/0.025s =1000/25 = 40Hertz
21	(a) Any two differences as given in the notebook (b)Transverse wave- light wave Longitudinal wave- sound wave
22	$\lambda = v/\nu = 340/512 = 0.66$m
23	Sound is a mechanical wave which requires a material medium for propagation.Since there is no material medium in space Sound can not be heard.

	SHORT ANSWER QUESTIONS (3 MARKS)
24	(a)Distance between the crest and next trough = $\lambda/2$ =10cm λ = 20cm = 0.20m ν = 12 Hz $v = \nu\lambda$ = 12 x 0.20 = Ans.240m/s (b) speed of sound increases on a hotter day
25	Ans. (a)Curved ceilings reflect the sound and spread it evenly across the width of the hall. (b) To avoid reverberation. Otherwise multiple echoes will interfere with the original sound and sound will not be heard distinctly. (c)To hear a distinct echo, The interval between the original and reflected sound must be 0.1 sec. Bats can not see still they catch their prey as they produce ultrasonic sound waves. This ultrasound is reflected back to the bat if their is any obstacle in its way and thus bats catch their prey.
	LONG ANSWER QUESTIONS
26	Frequency = 1/time period λ = 2 cm =0.02cm V = 16m/s $v = \nu\lambda$ $V/\lambda = \nu$ = 16/0.02 = 800Hz $T = 1/\nu$ = 1/800 = 0.00125sec
27	 **Yes, because the speed is same in air for all sounds**. Only the amplitude and frequency differ. So only loudness and pitch is affected.
28	Speed of sound = 340 ms^{-1} Time taken by thunder to be heard, t = d / v = 14s d = v x t = 340 x 14 = 4760 m Therefore, the distance of the cloud is 4760 m
29	(i) Amplitude = 5 cm (ii) Wavelength = 20 cm (iii) Velocity, v = $\nu\lambda$ = 100 x 20 x 10-2 = 20 ms-1

	(iv) Nature- It is a transverse wave.
	CASE STUDY BASED QUESTIONS
30	(a) The phenomenon that the sensation of sound persists in our brain for about 0.1s. (b)due to successive reflections of the sound from a number of reflecting surfaces such as the clouds and the land. (c) State the laws OR To reduce reverberation, the roof and walls of the auditorium are generally covered with sound- absorbent materials like compressed fibreboard, rough plaster or draperies. The seat materials are also selected on the basis of their sound absorbing properties.
31	(a) When sound waves travel through the medium the particles of the medium vibrate in the direction of propagation of the wave. (b) Energy (c) Sound is a form of energy and it is propagated through a medium in the form of pressure or density variations. OR Compression- Region of high pressure and low volume, where the particles of the medium are close together than normal. Rarefactions - Region of low pressure and high volume, where the particles of the medium are far apart than normal.

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