

1. What is sound waves? (ALP)

Sound is produced by a vibrating body. It travels in the medium from one place to another in the form of compressional waves. **OR**

Sound is form of energy that travels in the form of pressure waves from one place to another place.

****2. What is the necessary condition for the production of sound? (ALP)**

The necessary condition for the production of sound is that the body should vibrate.

Due to vibration of bodies the air around them also vibrates and the air vibration produces sensation of sound in air.

For example, in a guitar sound is produced when its wires vibrate.

***3. Why sound waves are called mechanical waves? (ALP)**

Waves which require any medium for their propagation are called mechanical waves. Sound waves can only travel or propagate in the presence of air (medium). That is reason sound waves are called mechanical waves.

***4. Mention the characteristics of sound. (ALP)**

Sounds of different objects can be distinguished on the basis of different characteristics of sound. These characteristics are the following.

(i) Loudness (ii) Pitch of sound (iii) Quality (iv) Intensity (v) Intensity level of sound.

5. What is tuning fork? On what factors frequency of tuning fork depends? (ALP)

In school laboratories, we use a device called tuning fork to produce a particular sound. If we strike the tuning fork against rubber hammer, the tuning fork will begin to vibrate. Its frequency depend upon the following factors

(i) Amplitude of prongs
(ii) Stiffness of material of tuning fork

****6. Define loudness. On what factors does the loudness of sound depend? (ALP)**

Loudness is the characteristic of sound by which loud and faint sounds can be distinguished.

Loudness of sound depends upon number of factors. Some of them are given below:

(i) Amplitude of vibrating body
(ii) Area of vibrating body
(iii) Distance from vibrating body

****7. Define pitch. (ALP)**

Pitch is the characteristic of sound by which we can distinguish between a shrill and a grave sound.

****8. Define the quality of sound. (ALP)**

The characteristic of sound by which we can distinguish between two sounds of same loudness and pitch is called quality.

****9. Why the sound of women and children is shrill as compared to men? (ALP)**

Pitch depends upon the frequency. A higher pitch means a higher frequency and vice versa. "The frequency of the voice of ladies and children is higher than that of men. Therefore, the voice of ladies and children is shrill and of high pitch."

10. How does loudness depends on the amplitude? OR What is effect of amplitude on loudness of sound? (ALP)

The loudness of the sound varies directly with the amplitude of the vibrating body. When we beat a drum forcefully, the amplitude of its membrane increases and we hear a loud sound.

***11. What is meant by soundless whistle? Write down its range. (ALP)**

Some people use silent whistle to call dogs. It is silent for human but not for dogs because the audible frequency range for dogs is much higher. The frequency range of soundless whistle lies between 20000 Hz to 25000 Hz.

****12. Define intensity of sound. Also write its SI unit. (ALP)**

Sound energy passing per second through a unit area held perpendicular to the direction of propagation of sound waves is called intensity of sound.

The unit of intensity of sound is watt per square meter (Wm^{-2}).

***13. What do you mean by the term intensity level of the sound? Also write its SI unit. (ALP)**

The difference between loudness L of unknown sound and loudness L_0 is called intensity level of sound.

$$\text{Intensity Level} = L - L_0 = K \log \frac{I}{I_0}$$

SI Unit: Unit of intensity level is "bel" is very large unit of intensity level of sound. Generally smaller unit decibel (dB) is used.

****14. Define unit of intensity level (bel). (ALP)**

The intensity I of any unknown sound is 10 times greater than the intensity of I_0 the faintest audible sound i.e. $I = 10I_0$ and the intensity level of such a sound is taken as unit, called bel.

$$1 \text{ bel} = 10 \text{ dB}$$

15. Define zero bel. (ALP)

The barely audible and the faintest intensity of sound i.e., $10^{-12} Wm^{-2}$ is taken as reference intensity, called zero bel.

***16. Drive the relation between loudness and intensity of sound. (ALP)**

Loudness L is directly proportional to the logarithm of intensity I .

$$L \propto \log I$$

$$L = K \log I$$

where K is constant of proportionality.

****17. Define echo. (Reflection of sound)**

When sound is incident on the surface of a medium it bounces back into the first medium. This phenomenon is called echo or reflection of sound.

18. In which sound move faster in solids or liquids? Why? (ALP)

In solids, sound move faster because in solids molecules are very near to each other.

In general, the speed of sound in a liquid is **five times** that in gases; the speed of sound in solid is about **fifteen times** that in gases.

19. Write the equation of the speed of sound. What is the speed of sound at room temperature and at atmospheric pressure?

Following relation can be used to find the speed of sound:

$$v = f\lambda$$

where v is the speed, f is the frequency and λ is the wavelength of sound wave.

Note: The speed of sound in air is 343 ms^{-1} at one atmosphere of pressure and room temperature (21°C).

****20. Define musical sound and noise.**

Musical Sound: Such sounds which are pleasant to our ears are called musical sounds. For example, sound produced by musical instruments such as flute, harmonium, violin, drum etc.

Noise: Such sounds which produce unpleasant and jarring effect on our ears are called noise. For example, sound of machinery, the slamming of a door, and sounds of traffic in big cities.

21. Define noise pollution.

Any form of sound which disturbs the normal functioning of any natural ecosystem or some human community is called noise pollution.

22. How can noise pollution can be reduced?

Noise pollution can be reduced to acceptable level by replacing the noisy machinery with environment friendly machinery and equipments, putting sound-reducing barriers, or using hearing protection devices.

***23. Define acoustic protection. Describe the importance of acoustic protection.**

Acoustics Protection: The technique or method used to absorb undesirable sounds by soft and porous surfaces is called acoustic protection.

Importance of Acoustics Protection:

- (i) Reflection of sound is less prominent if the surface is soft and irregular, but it is more prominent on rigid and smooth surface.
- (ii) Soft porous material such as draperies (پریزے) and rugs (تالین) absorb large amount of sound energy and thus quit echoes and softening noises.
- (iii) By using soft and sound insulating materials such as curtains, carpets and double glazed windows we can reduce the level of noise pollution.
- (iv) If surface of the class rooms and public halls are too absorbent, then sound level is low for audience.

***24. Define reverberation.**

When sound reflects from the walls, ceiling, and floor of a room, the reflecting surfaces are too reflective and the sound becomes garbled. This is due to multiple reflections called reverberations. **OR**

The garbled sound produced due to the multiple reflections is called reverberation.

***25. Define audible frequency range.**

The range of frequency which a human ear can hear is called the audible frequency range.

****26. What is the audible frequency range for human ear? (ALP)**

A normal human ear can hear a sound only if its frequency lies between 20 Hz and $20\,000 \text{ Hz}$. So, a human ear neither hears a sound of frequency less than 20 Hz nor a sound of frequency more than $20\,000 \text{ Hz}$. This is called audible frequency range.

27. What is frequency range of young children and old people? (ALP)

Different people have different range of audibility. It also decreases with age. Young children can hear sounds of $20\,000 \text{ Hz}$ but old people cannot hear sounds even above $15\,000 \text{ Hz}$.

28. Define propagation of sound. (ALP)

The transfer of sound from one place to another through any material medium is called propagation of sound.

29. What is difference between ultra sound and infra sound.

Sound waves of frequency higher than $20\,000 \text{ Hz}$ are called ultrasound while sound waves of frequency lower than 20 Hz are called infrasound.

30. What is range of intensity level for a human ear? (ALP)

The human ear responds to the intensities ranging from $10^{-12} Wm^{-2}$ to more than $1 Wm^{-2}$ (which is loud enough to be painful).

*31. What is ultrasound?

Sounds of frequency higher than 20, 000 Hz which are inaudible to normal human ear are called ultrasound or ultrasonic's.

32. Write down uses of ultrasound.

- (i) Ultra Sonic's are utilized in medical and technical fields.
- (ii) Powerful ultrasound is now being used to remove blood clots formed in the arteries.
- (iii) Ultrasound can also be used to get the pictures of thyroid gland for diagnosis purposes.

*33. What is meant by SONAR ?

Ultrasound is used to locate underwater depths or is used for locating objects lying deep on the ocean floor, etc. The technique is called SONAR, (sound navigation and ranging).

Procedure: The sound waves are sent from a transmitter, and a receiver collects the reflected sound. The time-lapse is calculated, knowing the speed of sound in water, the distance of the object from the ocean surface can be estimated.

34. What is stethoscope?

A devise used by doctors to hear the sounds of heart, lungs and stomach to check either working normally or not is called stethoscope.

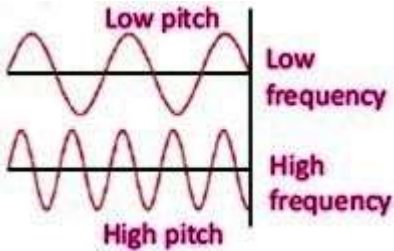
35. Define resonance.

Thin-walled glass goblets (جامے لے پیلے) can vibrate when hit by sound waves. This is due to a phenomenon of sound known as resonance.

36. What is difference between frequency and pitch? Describe their relationship graphically. (ALP)

Frequency	Pitch
Frequency is defined as the number of vibrations completed per second.	Pitch is the characteristic of sound by which we can distinguish between a shrill and a grave sound.
Its unit is Hertz (Hz).	It has no unit

Relationship Between Frequency and Pitch:



37. Is there any difference between echo and reflection of sound? Explain.

Yes, there is a difference. The reflection can take place at any distance from the denser medium at any time. But echo can be heard after 0.1 s, when distance between listener and reflecting surface is 17 m.

Important Long Questions

- (1) Define loudness of sound. On which factors loudness of sound depends?
- (2) What is intensity level of sound? Define its SI unit.
- (3) Write a note on characteristics of sound.
- (4) What is ultrasound? What are its benefits?