

## UNIT: 6- SOUND

CLASS: VIII

SUBJECT: SCIENCE

### I. Choose the best answer.

1. Sound waves travel very fast in

- a) air                      b) **metals**                      c) vacuum                      d) liquids

2. Which of the following are the characteristics of vibrations?

i. Frequency

ii. Time period

iii. Pitch

iv. Loudness

- a) i and ii                      b) ii and iii                      c) **iii and iv**                      d) i and iv

3. The amplitude of the sound wave decides its.

- a) speed                      b) pitch                      c) **loudness**                      d) frequency

4. What kind of musical instrument is a sitar?

- a) **String instrument**                      b) Percussion instrument  
c) Wind instrument                      d) None of these

5. Find the odd one out.

- a) Harmonium                      b) Flute                      c) Nadaswaram                      d) **Violin**

6. Noise is produced by

- a) vibrations with high frequency.                      b) regular vibrations.  
c) regular and periodic vibrations.                      d) **irregular and non-periodic vibrations.**

7. The range of audible frequency for the human ear is

- a) 2 Hz to 2000 Hz                      b) 20 Hz to 2000 Hz  
c) **20 Hz to 20000 Hz**                      d) 200 Hz to 20000 Hz

8. If the amplitude and frequency of a sound wave are increased, which of the following is true?

- a) **Loudness increases and pitch is higher.**  
b) Loudness increases and pitch is unchanged.  
c) Loudness increases and pitch is lower.  
d) Loudness decreases and pitch is lower.

9. Which of the following may be caused by noise?

- a) Irritation                      b) Stress                      c) Nervousness                      d) **All the above**

### II. Fill in the blanks.

1. Sound is produced by vibrating bodies.

2. The vibrations of a simple pendulum are also known as oscillation.
3. Sound travels in the form of mechanical waves.
4. High frequency sounds that cannot be heard by you are called Ultrasonic.
5. Pitch of a sound depends on the frequency of the vibration.
6. If the thickness of a vibrating string is increased, its pitch decrease.

### III. Match the following.

- |                          |   |                              |
|--------------------------|---|------------------------------|
| 1. Ultrasonics           | - | Frequency more than 20000 Hz |
| 2. Speed of sound in air | - | 330ms <sup>-1</sup>          |
| 3. Infrasonics           | - | Frequency below 20Hz         |
| 4. Sound propagation     | - | Needs material medium        |

### IV. Consider the statements given below and choose the correct option.

1. **Assertion:** When lightning strikes, the sound is heard a little after the flash is seen.

**Reason:** The velocity of light is greater than that of the sound.

**A. Both assertion and reason are true and reason is the correct explanation of assertion.**

B. Both assertion and reason are true but reason is not the correct explanation of assertion.

C. Assertion is true but reason is false.

D. Assertion is false but reason is true.

E. Both Assertion and reason are false.

2. **Assertion:** Two persons on the surface of moon cannot talk to each other.

**Reason:** There is no atmosphere on moon.

**A. Both assertion and reason are true and reason is the correct explanation of assertion.**

B. Both assertion and reason are true but reason is not the correct explanation of assertion.

C. Assertion is true but reason is false.

D. Assertion is false but reason is true.

E. Both Assertion and reason are false.

### V. Answer briefly.

#### 1. What is vibration?

Vibration means a kind of rapid to and fro motion of a particle. This to and fro motion of the particle causes the substances around it to vibrate.

## 2. Give an example to show that light travels faster than sound?

### Lightning:

The most common example of showing that light travels faster than sound is lightning. Whenever a lightning strikes, you see the lightning first and then hear the thunder after some time.

## 3. To increase loudness of sound by four times, how much should the amplitude of vibration be changed?

Loudness of a sound depends on the amplitude of the vibration. So to increase loudness of sound by four times, the amplitude of the vibration also to be increased by four times.

## 4. What is an ultrasonic sound?

A sound with a frequency greater than 20000 Hz is called as ultrasonic sound.

## 5. Give two differences between music and noise.

- ❖ The sound that provides a pleasing sensation to the ear is called 'music'. Music is produced by the regular patterns of vibrations.
- ❖ Any sound that is unpleasant to the ear is called noise. It is the unwanted, irritating and louder sound. Noise is produced by the irregular and non-periodic vibrations.

## 6. What are the hazards of noise pollution?

- ❖ Noise creates some health hazards. Some of them are listed below.
- ❖ Noise may cause irritation, stress, nervousness and headache.
- ❖ Long term exposure to noise may change the sleeping pattern of a person. Sustained exposure to noise may affect hearing ability.
- ❖ Sometimes, it leads to loss of hearing. Sudden exposure to louder noise may cause heart attack and unconsciousness. It causes lack of concentration in one's work.
- ❖ Noise of horns, loud speakers, etc., cause disturbances leading to lack of concentration. Noise pollution affects a person's peace of mind.

## 7. Mention few measures to be taken to reduce the effect of noise pollution.

- ❖ Strict guidelines should be set for the use of loudspeakers on social, religious and political occasions.

❖ All automobiles should have effective silencers.

## 8. Define the following terms.      a. Amplitude      b. Loudness

Amplitude      Loudness

### 1. Amplitude:

Amplitude is the maximum displacement of a vibrating particle from its mean position. It is denoted by 'A' and its unit is 'metre' (m).

### 2. Loudness:

It is defined as the characteristic of a sound that enables us to distinguish a weak or feeble sound from a loud sound. The unit of loudness of sound is decibel (dB).

## 9. How does planting trees help in reducing noise pollution?

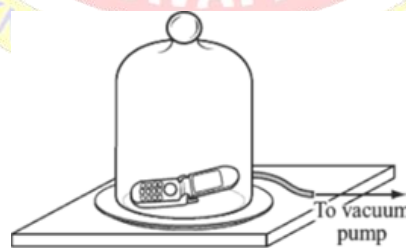
❖ Plant parts such as stems, leaves, branches wood, etc., absorb sound.

Rough bark and thick, fleshy leaves are particularly effective at absorbing sound due to their dynamic surface area and helps in reducing noise pollution.

## VI. Answer in detail.

### 1. Describe an experiment to show that sound cannot travel through vacuum.

Take a bell jar and a mobile phone. Switch on the music in the mobile phone and place it in the jar. Now, pump out the air from the bell jar using a vacuum pump. As more and more air is removed from the jar, the sound from the mobile phone becomes feebler and finally, very faint.



It is clear from this experiment that sound cannot travel in vacuum and it needs a medium like air. Sound travels in water and solids also. The speed of sound is more in solids than in liquids and it is very less in gases.

### 2. What are the properties of sound?

#### Loudness

It is defined as the characteristic of a sound that enables us to distinguish a weak or feeble sound from a loud sound. The loudness of a sound

depends on its amplitude. Higher the amplitude louder will be the sound and viceversa. When a drum is softly beaten, a weak sound is produced. However, when it is beaten strongly, a loud sound is produced. The unit of loudness of sound is decibel (dB).

### Pitch

The pitch is the characteristic of sound that enables us to distinguish between a flat sound and a shrill sound. Higher the frequency of sound, higher will be the pitch. High pitch adds shrillness to a sound. The sound produced by a whistle, a bell, a flute and a violin are high pitch sounds.

### Quality or Timbre

The quality or timbre is the characteristic of sound that enables us to distinguish between two sounds that have the same pitch and amplitude. For example in an orchestra, the sounds produced by some musical instruments may have the same pitch and loudness. Yet, you can distinctly identify the sound produced by each instrument.

### 3. What steps should be taken to reduce the effect of noise pollution?

Noise pollution can be significantly reduced by adopting the following steps.

- Strict guidelines should be set for the use of loudspeakers on social, religious and political occasions.
- All automobiles should have effective silencers.
- People should be encouraged to refrain from excessive honking while driving.
- Industrial machines and home appliances should be properly maintained. All communication systems must be operated in low volumes
- Residential areas should be free from heavy vehicles.
- Green corridor belt should be set up around the industries as per the regulations of the pollution control board.
- People working in noisy factories should wear ear plugs.
- People should be encouraged to plant trees and use absorbing materials like curtains and cushions in their home.

### 4. Describe the structure and function of the human ear?

The outer and visible part of the human ear is called pinna (curved in shape). It is specially designed to gather sound from the environment, which then reaches the ear drum (tympanic membrane) through the ear canal. When the sound wave strikes the drum, the ossicles move inward and outward to create the vibrations. These vibrations are then picked up by special types of

cells in the inner ear. From the inner ear the vibrations are sent to the brain in the form of signals. The brain perceives these signals as sounds.

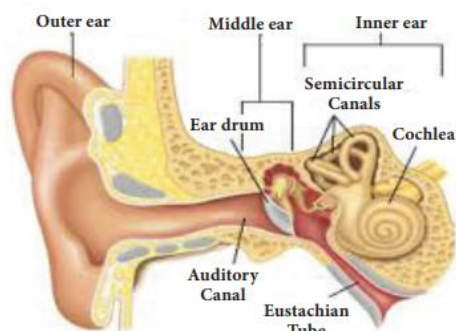


Figure 6.6 Human Ear

### VII. Problems.

1. Ruthvik and Ruha hear a gunshot 2 second after it is fired. How far away from the gun they are standing? (Speed of sound in air is Nequal to 330ms<sup>-1</sup>)

Solution:

Given : time  $t = 2s$

Speed of sound  $V = 330 \text{ ms}^{-1}$

To find: Distance  $d = ?$

Formula: Distance = Speed  $\times$  time

$$\text{Distance } d = 330 \times 2 = 660 \text{ m}$$

2. A sound wave travels 2000 m in 8 s. What is the velocity of the sound?

Distance travelled by a sound wave  $d = 2000 \text{ m}$

time taken  $t = 8s$

To find: Velocity of sound  $V = ?$

Formula:

$$\text{Velocity } V = \text{distance } (d) / \text{time } (t) = 2000/8 = 250 \text{ ms}^{-1}$$

3. A wave with a frequency of 500 Hz is traveling at a speed of 200 ms<sup>-1</sup>. What is the wavelength?

Given : Frequency  $n = ?$

Velocity  $V = 25 \text{ ms}^{-1}$

Wavelength  $\lambda = 12.5\text{m}$

To find: Frequency  $n = ?$

$$\text{Frequency } n = V (\text{velocity}) / \lambda (\text{Wavelength}) = 25 / 12.5 = 2 \text{ Hz.}$$