

## CHAPTER -10

### SOUND

#### EXERCISES

##### 1 Mark Questions

**Q1: Identify the part which vibrates to produce sound in the following instruments.**

1. Dholak
2. Sitar
3. Flute

**Answer:**

1. Stretched membrane
2. String of sitar
3. Air column

**Q2: Explain in what way noise pollution is harmful to humans.**

**Answer:**

Noise pollution causes:

- (a) Lack of sleep
- (b) Anxiety
- (c) Hypertension

and these are harmful to health.

**Q3: Lightning and thunder take place in the sky at the same time and at the same distance from us. Lightning is seen earlier and thunder is heard later. Can you explain why?**

**Answer:** The speed of light is more than that of the speed of sound. Thus, due to more speed of light it reaches us before sound. So, lightning is seen earlier and thunder is heard later.

**Q4: Define vibration.**

**Answer:** Vibration is the to and fro or back and forth motion of an object.

**Q5: In which state of matter does sound travel the**

- slowest
- fastest?

**Answer:**

- Air.
- Solids.

**Q6: What happens to sound when it strikes a surface?**

**Answer:** Sound gets reflected on striking a surface.

**Q7: Why do we hear the sound of the horn of an approaching car before the car reaches us?**

**Answer:** This happens because the speed of sound is much greater than the speed of the car.

**Q8: What is range of audible sound?**

**Answer:** Sound of frequency 20 Hz to 20,000 Hz is the audible range.

## **2 Mark Questions**

**Q1: The sound from a mosquito is produced when it vibrates its wings at an average rate of 500 vibrations per second. What is the time period of the vibration?**

**Answer:** The time period is defined as the time taken to complete one oscillation. It is also the inverse of frequency.

Time period =  $\frac{1}{f}$

Oscillation frequency

Oscillation frequency = 500 Hz

The time period of the vibration =  $\frac{1}{500} = 0.002 \text{ s}$

**Q2: List sources of noise pollution in your surroundings.**

**Answer:** Noise pollution sources in our surroundings are listed below:

- (a) Bus and car horns
- (b) Firecrackers and loudspeakers
- (c) High volumes in televisions and transistors
- (d) Mixers at home
- e) Sirens from factories

**Q3: What are vocal cords? What is their function?**

**Answer:** The larynx has a pair of membranes known as vocal cords stretched across their length. The vocal cords vibrate and produce sound.

**Q4: Give an example each of:**

- 1. stringed instrument**
- 2. percussion instrument**
- 3. wind instrument**
- 4. striking instrument**

**Answer:**

1. Violin
2. Drums
3. Flute
4. Jal Tarang

**Q5: Can sound travel through water? How do whales communicate under water?**

**Answer:** Yes, sound can travel through water. Since sound can travel through water, the whales can communicate with each other.

**Q6: How is the pressure variation in a sound wave amplified in human ear?**

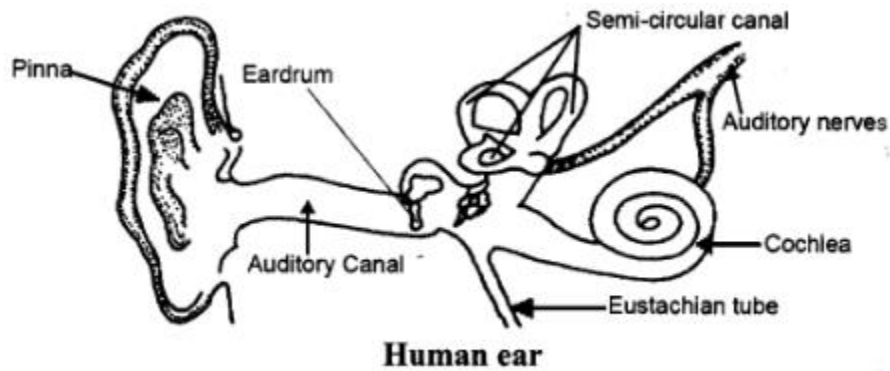
**Answer:** The pressure variation in a sound wave causes vibrations in the eardrum. These vibrations are amplified several times by the three bones. (The hammer, anvil and stirrup).

**Q7: How is that you can hear a friend talking in another room without seeing him?**

**Answer:** Sound can travel in all directions and around comers. Light cannot travel around comers. Therefore, we can hear a friend talking in another room but cannot see him.

**Q8: Draw a labeled diagram showing the structure of the human ear.**

**Answer:**



**Q9: Give some suggestions by which we can keep our ears healthy.**

**Answer:**

1. Never insert any pointed object into the ear. It can damage the eardrum and make a person deaf.
2. Never shout loudly in someone's ear.
3. Never hit anyone hard on their ear.

**Q10: What are ultrasounds? How are they useful to us?**

**Answer:**

Sound having frequency higher than 20 kHz is known as ultrasound, is used for

- Detecting finer faults in metal sheets.
- Scanning and imaging the body for stones, tumor and fetus.

## 5 Mark Questions

**Q1: A pendulum oscillates 40 times in 4 seconds. Find its time period and frequency.**

**Answer:**

The number of oscillations per second of the vibrating body is known as the frequency of oscillation.

Frequency = Total number of oscillations

Total time taken

$$= 50/5$$

$$= 10 \text{ Hz}$$

The time period is the time taken to complete one oscillation. It is also the inverse of frequency.

Time period =  $1/\text{Oscillating frequency}$

$$= 1/10$$

$$= 0.1 \text{ s}$$

$$\therefore \text{Frequency} = 10 \text{ Hz}$$

$$\text{Time period} = 0.1 \text{ s}$$

**Q2: What is the difference between noise and music? Can music become noise sometimes?**

**Answer:** Music is a sound which is pleasant to hear. Sounds from flutes, pianos and violins are pleasant to hear.

Noises are sounds which are unpleasant to hear.

Sounds which are unpleasant to hear are:

- (a) Sounds from bus horns and truck horns.
- (b) Electrical generator sounds.
- (c) Gunshot sounds.
- (d) Jackhammer sounds

Yes, sometimes, when the music is played at high volumes, it also becomes noise.

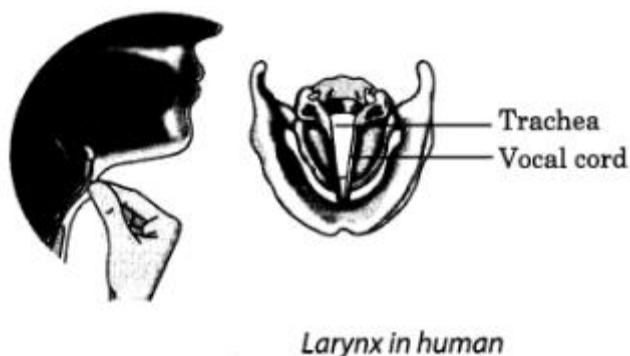
**Q3: Your parents are going to buy a house. They have been offered one on the roadside and another three lanes away from the roadside. Which house would you suggest your parents should buy? Explain your answer.**

**Answer:**

It is better to buy the house which is three lanes away from the roadside as there will be less noise as compared to the one on the main road. The noises can be caused by vehicles; as the distance between the source and the listener increases, the intensity of the noise decreases. So it's better to buy the house which is three lanes away from the roadside.

**Q4: Sketch the larynx and explain its function in your own words.**

Answer:



When we swallow something, the larynx moves. There are two vocal cords inside the larynx. The air passes through a small gap which is present in between them. The lungs force the air into the gap when we speak, and this vibrates the vocal cord, due to which sound is produced.

**Q5: 1.Name a property of sound which is**

**(i) similar to the property of light.**

**(ii) Different from that of light.**

**2. Why do some people have hearing impairment? How do they communicate with others?**

Answer:

1. (i) The property of sound similar to light is that in both reflection takes place.  
(ii) Sound can travel around comers but light cannot.
2. Some people suffer from hearing impairment because their ear drum is damaged or absent. This can be from birth or may occur later on. Such people communicate with “sign language”. They can also use “hearing aids”.



## Fill in the blank

1. Time taken by an object to complete one oscillation is called \_\_\_\_\_

**Answer:** Time period

2. Loudness is determined by the \_\_\_\_\_ of vibration.

**Answer:** Amplitude

3. The unit of frequency is \_\_\_\_\_

**Answer:** Hertz (Hz)

4. Unwanted sound is called \_\_\_\_\_

**Answer:** Noise

5. The shrillness of a sound is determined by the \_\_\_\_\_ of vibration.

**Answer:** Frequency

6. \_\_\_\_\_ Is proportional to the square of amplitude.

**Answer:** Tuning fork

7. If the thickness of the vibrating string is increased its pitch \_\_\_\_\_

**Answer:** Decrease

8. Speed of sound highest in \_\_\_\_\_ medium.

**Answer:** solid

9. The range of audible frequency for the human ear is \_\_\_\_\_

**Answer:** 20Hz to 20,000Hz

10. Noise is produced by \_\_\_\_\_

**Answer:** Irregular and non-periodic vibrations

## Multiple Choice Questions

**1. Sound can travel through**

- (a) Gases only
- (b) solids only
- (c) liquids only
- (d) solids, liquids, and gases

**Answer:** (d) solids, liquids, and gases

**2. Voice of which of the following is likely to have a minimum frequency?**

- (a) Baby girl
- (b) Baby boy
- (c) A man
- (d) A woman

**Answer:** (c) A man

**3. The maximum displacement of a vibrating body on either side of its mean position, is known as its**

- (a) Frequency
- (b) Loudness
- (c) Amplitude
- (d) Pitch

**Answer:** (c) Amplitude

**4. The frequency of a given sound is 1.5 kHz. The vibrating body is**

- (a) Completing 1,500 vibrations in one second.
- (b) Taking 1,500 seconds to complete one vibration.
- (c) Taking 1.5 seconds to complete one vibration.
- (d) Completing 1.5 vibrations in one second

**Answer:** (a) Completing 1,500 vibrations in one second

**5. A given sound is inaudible to the human ear, if**

- (a) Its amplitude is too small.
- (b) Its frequency is below 20 Hz.
- (c) its frequency is above 20 kHz.
- (d) It has any of the three characteristics listed above.

**Answer:** (d) It has any of the three characteristics listed above

**6. Sounds having frequency more than 20 Hz are called**

- (a) Infrasonic
- (b) Supersonic
- (c) Ultrasonic
- (d) None of these

**Answer:** (c) Ultrasonic

**7. Hertz is the unit of**

- (a) Amplitude
- (b) Frequency
- (c) Pitch
- (d) Wavelength

**Answer:** (b) Frequency

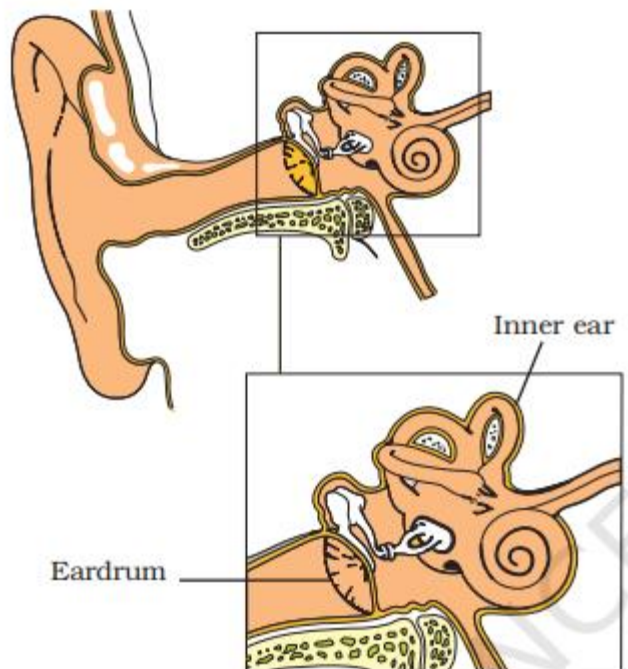
**8. Loudness of sound is expressed in**

- (a) Hertz
- (b) Decibel
- (c) Seconds
- (d) None of these

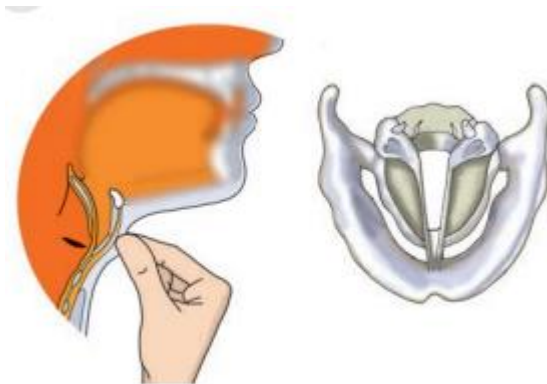
**Answer:** (b) Decibel

## DIAGRAMS:

### HUMAN EAR:



### LARYNX IN HUMAN



## SUMMARY

**Sound:** Vibrations that travel through the air or another medium and can be heard when they reach a person's or animal's ear.

**Musical Sound:** The sound which produce a pleasing effect on the ear.

**Noise:** The sounds which produce a jarring or unpleasant effect.

### **Types of Sound:**

**(i) Audible Sound:** Vibrations whose frequency lies between 20 Hz to 20,000 Hz (20 KHz) are heard by human ear.

**(ii) Inaudible Sound:** The sounds having frequencies above 20,000 Hz and below 20 Hz cannot be heard by the normal human ear.

- Low frequency sounds which cannot be heard are called **infrasonic**.
- High frequency sounds which cannot be heard are called **ultrasonic**.

In human beings, the vibration of the vocal cords produces sound.

Sound travels through a medium (gas, liquid or solid). It cannot travel in vacuum.

The eardrum senses the vibrations of sound. It sends vibrations to the inner ear.

From there, the signal goes to the brain. That is how we hear.

Higher the frequency of vibration, the higher is the pitch, and shriller is the sound. Unpleasant sounds are called noise.

### **Characteristics of Sounds:**

**(i) Loudness:** The sensation produced in the ear which enables us to distinguish between a loud and a faint sound. Larger the amplitude of vibration, the louder is the sound produced. It is proportional to square of the amplitude.

**(ii) Pitch:** The characteristics of sound which distinguishes between a shrill sound and a soft sound. Higher the frequency of vibration, higher is the pitch and shrillness.

**(iii) Quality:** Characteristic which enables us to distinguish between musical notes emitted by different musical instruments or voices even though they have the same pitch and loudness.