Lesson 13. Sound

Grade : VIII

Basic concepts – A Flow Chart

SOUND

A kind of sensation received by our ears and perceived by our brain.

Types of Sound

Musical Sound

The sounds which produce a pleasing effect of the ear.

Noise

The sounds which produce a jarring or unpleasant effect.

Audible Sound

Vibrations who Frequency lies between 20 Hz to 20.000 Hz (20kHz).

Inaudible Sound

The sounds having frequencies above 20.000 Hz and below 20 Hz cannot be heard by the normal human ear.

Noise Pollution

- Excessive or unwanted sound leads to noise pollution.
- It may pose health problems for human beings.
- Plantation on the roadside and elsewhere can reduce noise pollution.

Production of Sound

- A vibration is a repeated to and fro motion
- Sound is produced by vibration objects.
- In Human beings, the vibration of the vocal cords produces sound.

Characteristics of Vibration

Amplitude

The maximum distance of a vibration or swinging object from position of rest.

Time period

- One complete to and from movement of the pendulum around its mean position is called one oscillation.
- The time taken by the vibration particle to complete on oscillation is called time period.

Frequency

- The number of vibration or oscillations made by a vibrating body in a second.
- The unit of frequency is hertz. (Hz).

Propagation of Sound

Sound needs a medium for propagation.

Sound In Gases

When an object vibrates in air, it disturbs the air particles surrounding it causing them to vibrate.

Sound In Liquids

When sound travels through a solid it moves even faster than through a liquid because of the close interaction of the particles in the farmer.

Sound In Solids

When sound travels through a solid it moves even faster than through a liquid because of the close interaction of the particles in the former.

Sound In Vacuum

Sound cannot travel through a vacuum because it does not contain any particles to pass on the vibrations,

Characteristics of Sound

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.

Pitch

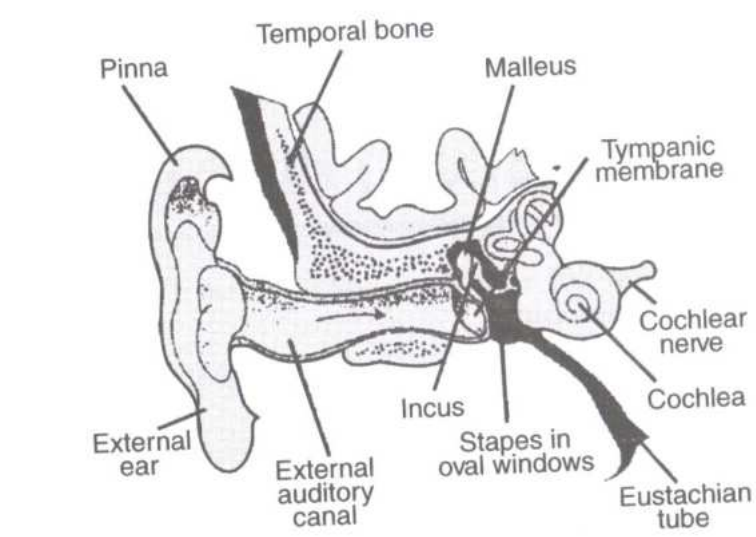
- The characteristic of sound which distinguishes between a shrill sound and a soft sound.
- Higher the frequency of vibration, higher is the pitch.

Quality

Characteristic which enables us to distinguish between musical notes emitted my different musical instruments or vices even though they have the same pitch and loudness.

Know the Terms

- **Amplitude** is the maximum distance from mean position, Loudness of sound depends upon its amplitude.
- **Time Period :** The time taken by a vibrating body to complete one oscillation.
- Frequency is the number of oscillations per second. The SI unit of frequency is Hertz. The frequency determines the shrillness or pitch of a sound. Usually male has low pitched (bass) sound and female has high pitched sound (Shrill)
- 20 Hz to 20,000 Hz is audible for human beings. Sound less than 20 Hz frequency is called infrasonic sound and sound more than 20 kHz is called ultrasonic sound.
- Unpleasant sound called noise may cause health problems to human beings
- **Noise pollution :** Television, transistors, radios at high volumes, desert coolers, air conditioners, horn of vehicles etc. Cause noise pollution.
- **Measures to limit noise pollution :** Silence devices must be installed in air craft engines, transport vehicles etc., Trees must be planted along the roads and around buildings to cut down on the sound.
- **We hear sounds through our ears. The human ear has three main parts :**



- **Outer ear :** It has a canal at the end of which is a stretched membrane called eardrum. The sound waves pass through ear canal and eardrum to vibrate.
- **Middle ear :** It has a set of three bones that are linked together and attached to the eardrum. These bones receive vibrations from eardrum and pass on to the inner ear.
- **Inner ear :** The inner ear received vibrations from the middle ear and changes them into nerve impulses that are interpreted by the brain and we hear the sound.

- If v = velocity of sound wave, n= frequency of sound wave, λ= wavelength of sound wave. Then $v = n\lambda$
- Maximum speed of sound is in solids, followed by liquids and then in gases.
- **Musical Sounds :** The sounds which produce pleasant sensation to the ear are termed as musical sounds.
- **Musical Instruments :** Musical Instruments are generally of the following types.
- **String Instruments :** The vibration of string produces musical sound as in sitar.
- **Wind Instruments or reed instruments :** The column of air is vibrated by blowing air directly through tubes is known as reeds as in Shehnai or Flute.
- **Membrane Instruments :** The musical sound is produced due to the vibration of skin or membrane mounted on the instruments such as table.
- **Ghana vadya :** The instruments which are simply beaten or struck as in the Manjira (cymbals) and Jal Tarang.
- **Noise :** The sounds which produce unpleasant sensation to the ears are termed as noise.
- **Vacuum :** When air is removed from a vessel, then it is called vacuum
- Sound plays an important role in our lives
- We hear a variety of sounds in our surroundings.
- Sound is produced by musical instruments like flute and tabla by vibration.
- The vibratory motion is also known as oscillatory motion.
- The unit of frequency is hertz.
- Eardrum : When sound enters in outer ear, it travels down a canal at the end of which a thin membrane is stretched tightly. It is called eardrum.
- Wind pipe : The tube like vessel through which air enters in the lungs is called wind pipe.
- Note pollution : The presence of excessive or unwanted sounds in the environment is called noise pollution.

Objective Type Questions

(1 Marks)

I. Multiple Choice Questions

1. A list of mediums is given below :

i) wood ii) air iii) water iv) vacuum

In which of these mediums can sound travel?

a. i & ii only b. i, ii & iii only c. iii & iv only d. ii, iii & iv only

2. The loudness of sound depends on :

a) its amplitude b) Its frequency c) Its time period d) its speed

3. Which of the following statements are correct ?

i) Sound is produced by vibrations

ii) Sound requires a medium for propagation

iii) Light and sound both require a medium for propagation

iv) Sound travels slower than light .

a) i & ii only b) i,ii & iii only c) ii,iii & iv only d) i,ii & iv only

4. An object is vibrating at 50 hertz. What is its time period?

a) 0.02s b) 2s c) 0.2s d) 20.0s

5. In order to reduce the loudness of a sound we have to :

a) decrease its frequency of vibrations b) increase its frequency of vibrations

c) decrease its amplitude of vibrations d) increase its amplitude of vibrations

6. Loudness of sound is measured in units of :

a) decibel (dB) b) hertz (Hz) c) metre (m) d) meter/second (m/s)

7. The loudness of sound is determined by the :

a) amplitude of vibration b) ratio of amplitude and frequency of vibration

c) frequency of vibration d) product of amplitude and frequency of vibration

8. 1 hertz is equal to :

a) 1 vibration per minute b) 10 vibrations per minute

c) 60 vibrations per minute d) 600 vibrations per minute

9. Pitch of sound is determined by its

a) Frequency b) amplitude c) speed d) loudness

10. Ultrasound has frequency of vibrations

a) between 20 and 20,000 Hz b) below 20 Hz

c) above 20,000 Hz d) between 500 and 10,000 Hz

1. b	2. a	3. d	4. a	5. c	6. a	7. a	8. c	9. a	10. c

II. Multiple Choice Questions

1. Eardrum is a part of

a. Sound producing organ
b. Skeletal system
c. Hearing organ
d. Reproductive organ

2. The hearing range of human ear is

a. 20 Hz to 20,000 Hz
b. Less than 20 Hz
c. More than 20,000 Hz
d. 20 Hz to 25,000 Hz

3. The voice box is also called

a. Stomach
b. Heart
c. Larynx
d. Mouth

4. Large amplitude of sound vibrations will produce

a. Loud sound
b. Meak sound
c. Slow sound
d.Shreak

5. The pitch of sound depends on

a. Frequency
b. Amplitude
c. Both of these
d. None of these

6. Sound is a kind of

a. Work
b. Energy
c. Force
d. None

7. To and fro motion of an object is called

a. Waves
b. Amplitude
c. Vibration
d. All of above

8. Voice box or larynx of human produces

a. Sound
b. Wind
c. Loudness
d. None

9. Sound propagates maximum in

a. Gas
b. Liquid
c. Solid
d. All

10. Noise pollution is harmful for

a. Human
b. Cat
c. Bird
d. All

1. c	2. a	3. c	4. a	5. a
6. b	7. c	8. a	9. c	10. d

I. Fill in the blanks

1. _____ is produced by vibrating objects.
2. In human being, the vibration of the _____produces sound.
3. The frequency is expressed in_____.
4. Larger the amplitude of vibration the _____is the sound.
5. Unpleasant sounds are called _____.
6. _____on the roadside and everywhere can reduce noise pollution.
7. Loudness is determined by _____.
8. Dogs have the ability to hear sounds of frequencies higher than _____Hz.

1. Sounds	2. vocal cords	3. Hertz	4. Louder
5. Noise	6. Plantation	7. amplitude	8. 20,000 Hz

II. Fill in the blanks

1. The number of oscillations in one second is called _____.
2. The hearing range of human ears is _____.
3. Sound cannot travel in _____.
4. Sound can travel in _____ , _____ and _____ medium.
5. Time taken to complete one oscillation is called _____.
6. The loudness of normal breathing of human is _____.
7. Above _____ the noise becomes physically painfull.
8. Unpleasant sounds are called _____.
9. Excessive noise may cause many _____ related problems.
10. Plantation on the roadside can reduce _____.

1. Frequency	2. 20 Hz to 20,000 Hz	3. Vacuum	4. Solids, liquids, gases	5. Time period
6. 10 dB	7. 80 dB	8. Noise	9. Health	10. Noise pollution

I. Match the following

I. Column A		Column B	
(i)	Unit of frequency	(a)	Vibrations of the body
(ii)	Low frequency	(b)	Music
(iii)	Sound	(c)	Noise
(iv)	Pleasant sounds	(d)	Hertz
(v)	Unwanted sounds	(e)	Low shrillness

(i) . (d)	(ii) . (e)	(iii) . (a)	(iv) . (b)	(v) . (c)

II. Column A		Column B	
(i)	Back and forth motion	(a)	Thin membrane
(ii)	Ektara	(b)	Vibration
(iii)	Voice box	(c)	Decibel
(iv)	Eardrum	(d)	Musical instrument
(v)	Loudness	(e)	Larynx

(i) . (b)	(ii) . (d)	(iii) . (e)	(iv) . (a)	(v) . (c)

II. Match the following

Column I		Column II	
1	Audible	(i)	Amplitude
2.	Eardrum	(ii)	Voice box
3.	Hertz	(iii)	20 Hz to 20,000 Hz
4.	Larynx	(iv)	This membrane in ear
5.	Loudness	(v)	Frequency determine it
6.	Oscillation	(vi)	Voice box on this
7.	Patch	(vii)	One complete vibration
8.	Wind pipe	(viii)	Unit of frequency

1. (iii)	2. (iv)	3. (viii)	4 . (ii)	5. (i)
6. (vii)	7. (v)	8) (vi)		

I. True or False

1. Only air can cause pollution, not sound
2. Plantation of trees can reduce the sound pollution.
3. Health disorders can be caused by noise pollution.
4. Unpleasant sounds are called music.
5. Nobody can hear sounds of frequencies higher than 20,000 Hz,
6. A bird makes a high – pitched sound whereas a lion makes a low pitched roar,
7. Loudness of sound depends upon pitch.
8. Sound can travel through wood or metal.
9. Sound is produced in human by voice box and the larynx
10. Only to and fro motion of a object is called vibration.

1. False	2. True	3. True	4 . False	False
6. True	7. False	8. True	9. True	10. False

II. True or False

1. Sound can travel in vacuum.

2. We can hear the sound of the frequency 20 Hz to 20,000 Hz.

3. The sound cannot travel in solid materials.

4. The sound is caused due to propagation of vibrations.

5. The pitch of a sound depends on the frequency of the waves.

7. Sound does not need a medium for propagation.

8. The number of oscillations per second is called amplitude.

9. The frequency determines the shrillness or pitch of a sound.

10. The loudness is expressed in a unit called decibel.

1. False	2. True	3. False	4. True	5. True
6. True	7. False	8. False	9. True	10. True

Quiz Time

1. How does sound help us?

2. Write the names of some musical instruments which produce musical sound.

3. How is sound produced?

4. When we speak, which part of our body vibrates?

5. Why does sound not travel in vacuum?

6. What is the length of vocal cord of men and women?

7. In which medium sound travels the fastest air, liquid or a solid?

8. What is pitch?

9. What is the unit of loudness?

10. When does the noise become painful?

11. What is audible sound?

12. In what unit frequency is expressed?

Answers:

1. It helps us to communicate with one another.

2. Harmonium, Tabla , Sitar , Flute etc.

3. Sound is produced by a vibrating body.

4. Our vocal cord vibrates and produces sound.

5. Vacuum does not have a medium for propagation of sound.

6. The vocal cords is a man is about 20 mm long and in a woman about 15 mm long.

7. In solid, sound travels the fastest.

8. When the brain interprets the frequency of an emitted sound it is called its pitch. The frequency determines the shrillness or pitch of a sound.

9. The loudness is expressed in a unit called decibel (dB).

10. Above 80 dB the noise becomes physically painful.

11. Frequency between 20 Hz to 20,000 Hz is audiable sound.

12. Frequency is expressed in hertz (Hz).

NCERT CORNER

Intext Questions

1. Paheli : When we speak, do we also vibrate any part of our body

Yes, the vocal cords vibrate to produce sound.

2. Boojho wonders why his voice is different from that of his teacher

The sounds are different due to the shrillness or pitch of sound which can be determined by the frequency. If the frequency of sound is higher, we say that the sound has a higher pitch.

3. How is the blind folded person able to guess which player is closer to her?

The vibration due to the movement of closer player is more than others and the blind folded person easily imagines to which direction a player is and how nearer to her.

4. How does the sound travel?

The sound travels through the different mediums i.e., solid, liquid or gases.

5. Can you say that the frequency of the voice of a child is higher than that of an adult?

Yes, as the sound of children is shriller than the sound of adults. So, the frequency of sound produced by a child is more than that of an adult.

6. How can we recognize many familiar sound without seeing the objects producing them?

We can differentiate sounds on the basis of their amplitude and frequencies.

Textbook Questions

1. Choose the correct answer : Sound can travel through :

(a) air gases only (b) solids only

(c) liquids only (d) air, liquid and gas

(d) Sound can travel through air, liquid and gas.

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

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

(c) As frequency of man's voice is minimum.

3. In the following statements, Write T against those, which are true, and F against those which are false.

(i) Sound cannot travel in vacuum. (ii) Sound makes eardrum vibrate.

(iii) The number of oscillations per second of a vibrating object is called its time period.

(iv) If the amplitude of vibration is large, sound is feeble.

(v) For human ears, the audible range is 20 Hz to 20,000 Hz.

(vi) Lower the frequency of vibration, higher is the pitch.

(vii) Unwanted or unpleasant sound is termed as music.

(viii) Noise pollution may cause partial deafness.

(i) True	(ii) True	(iii) False	(iv) False	(v) True	(vi) False	(vii) False	(viii) True

4. Fill in the blanks with suitable words :

(i) Time taken by an object to complete one oscillation is called_____.

(ii) Loudness is determined by the _____of vibration.

(iii) The unit of frequency is _____.

(iv) Unwanted sound is called _____.

(v) Shrillness of a sound is determined by the _____.of vibrations.

(i) time period	(ii) amplitude	(iii) hertz	(iv) noise	(v) frequency

5. A pendulum oscillates 40 times in 4 seconds. Find its time period and frequency.

Time period is time taken to complete one vibration (or oscillation). Now pendulum takes 4 seconds to complete 40 oscillations, so it will take $\frac{4}{40}$ seconds or $\frac{1}{10}$ second to complete one vibration and it will complete $\frac{40}{4}$ = 10 vibrations in one second. So,

Time period = $\frac{1}{10}$ second

Frequency = 10 Hz

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

Mosquito vibrates 500 vibrations in one second. As, time period is the time taken to complete one vibration, so, 500 vibrations take 1 sec. to complete and 1 vibration will take $\frac{1}{500}$ sec to complete.

| Time period = $\frac{1}{500}$ sec

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

(i) Dholak (ii) Sitar (iii) Flute

Instrument		Vibrating part producing sound
(i) Dholak	-	Stretched membrane
(ii) Sitar	-	Stretched string
(iii) Flute	-	Air column

8. What is the difference between noise and music? Can music become noise sometimes?

Differences between Noise and Music are as

S.No.	Noise	Music
i	(i) It is unpleasant sound.	It is pleasant sound.
ii	(ii) It leads to noise pollution.	No such pollution takes place.
iii	(iii) It is hazardous to health.	It is good for health.
iv	(iv) No special instrum- ents are required to produce noise.	Special instruments are required to play music.

Sound which is unpleasant to our ears is called noise while the sound which is enjoyable, e.g. from musical instruments is called music. So, music produces a pleasing sensation. The loud music or music with high amplitudes becomes very harsh and not enjoyable. So, in this case, music becomes noise.

9. List sources of noise pollution in your surroundings.

Major causes of noise pollution are sounds of vehicles, explosions including bursting of crackers, machines, loudspeakers, television and transistor at high volumes, some kitchen appliances, desert coolers, air conditioners, etc. All these contribute to noise pollution.

10. Explain in what way noise-pollution is harmful to humans.

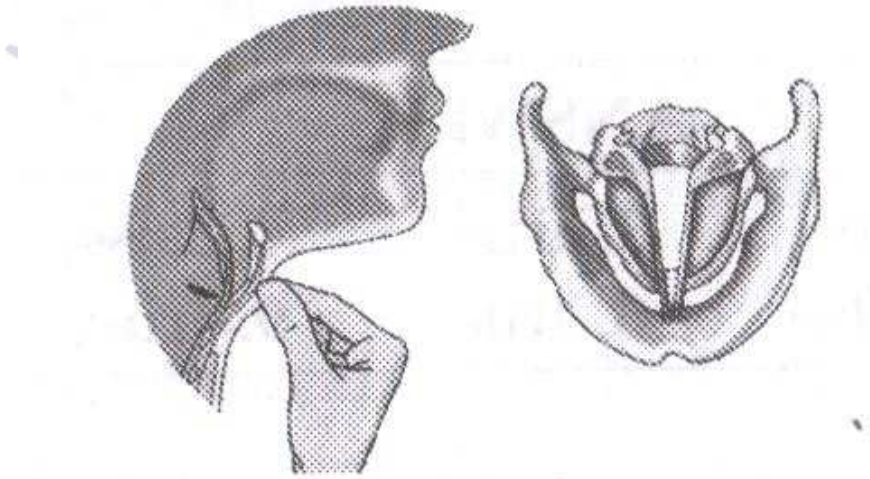
Lack of sleep, hypertension (high blood-pressure), anxiety and many more health disorders may be caused by noise pollution. Noise pollution also causes the temporary or even permanent deafness in human being.

11. 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.

We will prefer to buy the house three lanes away from the roadside because there will be less noise pollution than along the roadside.

12. Sketch larynx and explain its function in your own words.

In humans, the sound is produced by the voice box or the larynx. Put your fingers on the throat and find a hard bump that seems to move when you swallow. This part of the body is known as the voice box. Below it is the windpipe. Two vocal cords, are stretched across the voice box or larynx in such a way that it leaves a narrow slit between them for the passage of air.



When the lungs force air through the slit, the vocal cords vibrate, producing sound. Muscles attached to the vocal cords may make the cords tight or loose. When the vocal cords are tight and thin, the type or quality of voice is different from that when these are loose and thick.

13. Lightning and thunder takes place simultaneously in sky and at the same distance from us. Lightning is seen earlier and thunder is heard later. Can you explain?

As speed of sound is very less than the speed of light (speed of sound 332 m/sec. and speed of light 3 x 108 m/sec.), so light moves much faster than sound. So, we first observe the lightening and later we observe the thunder although both are produced simultaneously.

I. Very Short Answer Type Questions.

1. What is sound?

Sound is the medium by which we communicate with one another.

2. How is sound produced?

Sound is produced by vibrating bodies.

3. Do all bodies can produce sound?

No, all bodies cannot produce sound.

4. What do you feel when you touch a sound producing school bell?

We feel the vibrations in the bell.

5. Touch the bell when it stops producing sound. Can you feel the vibrations?

No, we cannot feel vibrations.

6. What do you understand by this?

We understand that only vibrating bodies can produce sound.

7. What do you understand by vibrations?

The back and forth motion of an object is called vibration.

8. In some cases we cannot see vibrations explain why is it so?

When amplitude of vibrations is very small, then we cannot see them.

9. What is amplitude?

The maximum displacement of a vibrating body on one side is called amplitude.

10. Name a musical instrument which produces sound by air column.

Flute.

11. Name the sound producing organ in human.

Larynx.

12. What is the other name of larynx?

Larynx is also called voice box.

13. What are vocal cords?

The cords stretched across the voice box or larynx are called vocal cords.

14. Do all animals produce sound by vocal cords?

No, all animals do not produce sound by vocal cords.

15. On which quality of sound or voice depend?

The quality of sound or voice depends on the looseness or tightness of vocal cords.

16. Do the length of vocal cords is same in men and women?

No, the length of vocal cords is not same in men and women.

17. What is the length of vocal cords in men and women?

The length of vocal cords in men and women is 20 mm and 15 mm respectively.

18. How does sound travel from one place to another?

Sound travels through a material medium from one place to another.

19. Can sound travel through vacuum?

No, sound cannot travel through vacuum.

20. What types of medium is required to travel sound?

The medium may be solid, liquid or gas.

21. How do whales and dolphins hear the sound?

Whales and dolphins live in water. They hear sound through water.

22. Name the organs in human which receives sound.

Ears.

23. What is outer part of ear called?

The outer part of the ear is called pinna. It is funnel shaped.

24. What is eardrum?

A thin and stretched membrane is called eardrum.

25. What is oscillatory motion?

The vibratory motion is also called oscillatory motion.

26. What do you mean by frequency?

The number of oscillations in one second is called frequency.

27. Write the unit of frequency.

The unit of frequency is hertz.

28. Define hertz.

A frequency of one hertz is one oscillation per second.

29. What are the two main properties of a sound which help us to recognise sound?

Amplitude and frequency are the two important properties of sound.

30. Define time period.

The time taken by a vibrating body to complete one oscillation is called time period.

31. On which factor loudness of sound depend?

The loudness of sound depends on the amplitude.

32. What is pitch or shrillness of a sound?

The characteristics of sound which depends on its frequency is called pitch of a sound.

33. What is the hearing range of human ears?

Hearing range of human ears is 20 Hz to 20,000 Hz.

34. What are frequencies of sound which are inaudible?

Less than 20 Hz and more than 20,000 Hz are inaudible.

35. How does the amplitude affect the loudness of voice?

Higher is the amplitude, louder is the voice.

36. Why the sound of a baby is feeble?

The sound of a baby is feeble due to its small amplitude.

37. What frequencies are heard by dogs and cats?

The dogs can hear up to 40,000 Hz frequencies while cats can hear up to 70,000 Hz frequencies.

38. What is ultrasound?

The sound having frequency more than 20,000 Hz is called ultrasound.

39. What is noise?

The loud sound which produces unpleasant sensation is called noise.

40. What do you mean by musical sound?

The sound which produces pleasant sensation is called musical sound.

41. Give examples of noise and musical sound.

The sound in classroom is noise while sound of any musical instrument is musical sound.

42. What do you mean by air pollution?

Presence of unwanted gases and dust particle sin air is called air pollution.

43. What is noise pollution?

Presence of excessive or unwanted sounds in environment is called noise pollution.

44. What sources in home may lead to noise?

Television, transistor, radio at high volume, desert coolers and air conditioners are the sources producing noise at home.

45. What is the unit of loudness?

Decibel (dB).

46. What is the loudness of a normal conversation?

60 dB.

47. Write a common ill effect of noise pollution.

The most common ill effect of noise pollution is temporary deafness.

48. Write any one method to control noise pollution.

To grow more and more plants along the road sides.

II. Very Short Answer Type Questions.

1. Does any part of our body vibrate when we speak? Name the part. (NCERT Exemplar)

Yes, while speaking, the part which vibrates is called vocal cords. It is below the throat and creates vibrations while speaking.

2. Name two musical instruments which produce sound by vibrating strings. (NCERT Exemplar)

Guitar and Sitar are the two musical instruments which produce the sound by vibrating strings.

3. The moment we hear a sound, does any part of our body vibrate? If yes, name the part. (NCERT Exemplar)

It is eardrum which vibrates and sends vibrations to the inner air, when we hear any sound.

4. What are Vocal cords?

The cords stretched across the voice box or larynx are called Vocal Cords.

5. Define sound.

Sound is a type of energy that makes us hear.

6. What is vibration?

The to and fro motion of an object is called vibration.

7. What is the other name of voice box?

Larynx.

8. Which two properties of sound help us to recognize it?

Frequency, amplitude.

9. Which animal can hear sounds of frequencies higher than 20,000 Hz?

Dogs, cats.

10. Write a common ill effect of noise pollution.

Hypertension.

11. Does sound travel through all mediums?

Yes, it travels through all mediums such as solid, liquid and gases.

12. Write a precaution to prevent eardrum damage.

Never put a sharp, pointed or hard thing into your ear.

13. Define 1 Hertz.

1 Hz is one oscillation per second.

14. What is the unit of loudness ? At and after which range does noise become painful?

Decibel; at about 80 dB and afterwards the noise becomes audible painful.

15. On which factor does loudness of sound depend ?

The loudness of sound depends on the amplitude.

16. What is pitch or shrillness of a sound ?

The characteristic of sound which depends on its frequency is called pitch of a sound.

17. What is the hearing range of human ears?

Hearing range of human ears is 20 Hz to 20,000 Hz.

18. How does the amplitude affect the loudness of voice?

Higher is the amplitude, louder is the voice.

III. Very Short Answer Type Questions.

1. Lightning can be seen the moment it occurs. Paheli observes lightning in her area. She hears then sound 5 s after she observed lightning. How far is she from the place where lightning occurs?

(speed of sound =330m/s).

Distance = 330 m/s x 5s

= 1650 m

2. Does any part of our body vibrate when we speak? Name the part.

Yes, Larynx (vocal cords).

3. Boojho saw a cracker burst at night at a distance from his house. He heard the sound of the cracker a little later after seeing the cracker burst. Give reason for the delay in hearing the sound.

The speed of sound is lower than that of the speed of light and therefore sound reaches him later than light.

4. When we hear a sound, does any part of our body vibrate? Name that part.

Yes, eardrum.

5. Name tow musical instruments which produce sound by vibrating strings ?

Sitar and Ektara (any other musical instruments which produces sound by a vibrating string)

6. Define vibration.

The to and fro or back and forth motion of an object is termed as vibration.

7. Why the voice of men, Women and children are different?

The vocal cords in men are about 20mm long. In women these are about 5 mm shorter. Children have very short vocal cords. This is the reason why the voice of men, women and children are different.

8. Name two important properties of sound.

Amplitude and frequency.

I. Short Answer Type Questions.

1. A simple pendulum makes 10 oscillations in 20 seconds. What is the time period and frequency of its oscillation?

Time period = $\frac{20}{10}$= 2s

Frequency = $\frac{1}{2\,s}$ = 0.5 oscillations/s

2. We have learnt that vibration is necessary for producing sound. Explain why the sound produced by every vibrating body cannot be heard by us.

If the sound produced by a vibrating body is in the audible range. The sound produced will be heard by us otherwise we will not be able to hear the sound even though the body is vibrating.

3. Suppose a stick is struck against a frying pan in vacuum. Will the frying pan vibrate? Will we be able to hear the sound? Explain.

The frying pan will vibrate. We will not be able to hear the sound of vibration because sound cannot travel in vacuum.

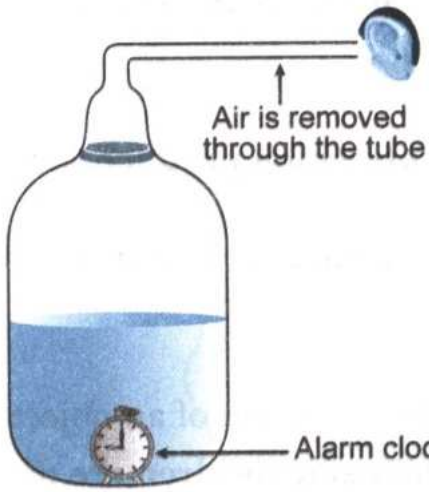
4. Two astronauts are floating close to each other in space. Can they talk to each other without using any special device? Give reasons.

No, in space there is vacuum and sound cannot travel in vacuum.

5. Define frequency. What is its SI unit?

The number of oscillations per second is called the frequency of oscillation. Its SI unit is hertz (Hz).

6. An alarm bell is kept inside a vessel as shown in the figure below. A person standing close to it can distinctly hear the sound of alarm. Now if the air inside the vessel is removed completely how will the loudness of alarm get affected for the same person?



The loudness off the sound will decrease as the air is removed slowly form the plastic bottle. If the air in the plastic bottle is removed completely, there is vacuum in the bottle. The sound cannot travel through vacuum and we cannot hear the sound of the alarm clock at all.

7. We have a stringed musical instrument. The string is plucked in the middle first with a force of greater magnitude and then with a force of smaller magnitude. In which case would the instrument produce a louder sound?

The loudness of sound depends upon the amplitude of vibration. The amplitude of string is larger when it is plucked with greater force and hence the sound will be louder in that case.

II. Short Answer Type Questions.

1. How is sound produced?

The vibrating bodies produce the sound. When a body vibrates, sound is produced. If vibrations are stopped the sound is not produced any more.

2. Explain the importance of sound in our daily life.

Sound play an important role in our daily life. Our life depends on sounds for each and every action. Without sound we cannot know what others communicate or want to say. Sound enables us to communicate with each other.

3. What are musical instruments? How do they produce sound?

The devices which produce various types of sounds which are pleasant to our ears are called musical instruments. Such sound is called music.

The musical instruments have strings or the stretched membranes attached or fixed to them. Some instruments have air columns. When these instruments vibrate, the sound is produced.

4. Explain with the help of an activity that vibrating bodies produce sound.

Take a rubber band, put it around the longer side of a pencil box. Insert two pencils between the box and stretched rubber. Pluck the rubber band somewhere in the middle. You hear a sound and also see that rubber band vibrates. This activity shows that vibrating objects produce sound.

5. Do you see the vibrations in all the cases?

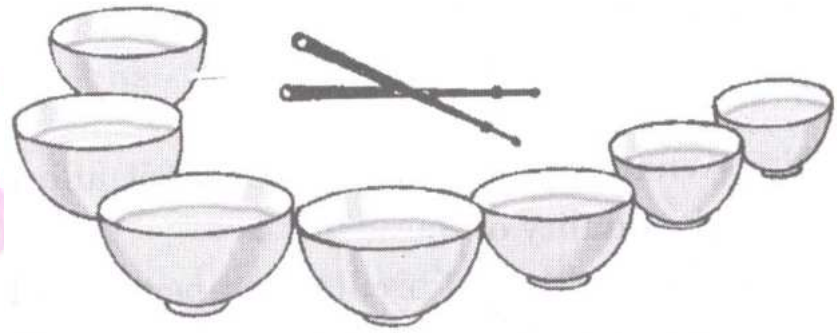
The vibrating objects produce sound. In some cases the vibrations are easily visible to us. But in most of the cases, the vibrations are not visible due to very small amplitude. But the vibration is all the cases can be felt.

6. What is ektara? Identify its vibrating part.

Take a hollow coconut shell or an earthen pot and make a musical instrument. Such instrument is called ektara. Play this instrument, you hear a sound. The stretched rubber band or a wire is its vibrating part.

7. Explain the principle on which Jaltrang works.

Jalltrang works on the principle that the quality of sound is changed a sits frequency changes. Metal tumbler filled with water up to different heights, give vibrations of different frequencies, hence produce different type of sounds.

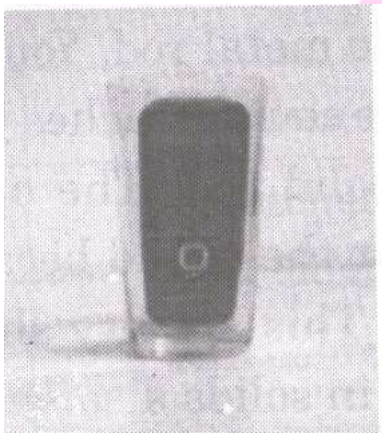


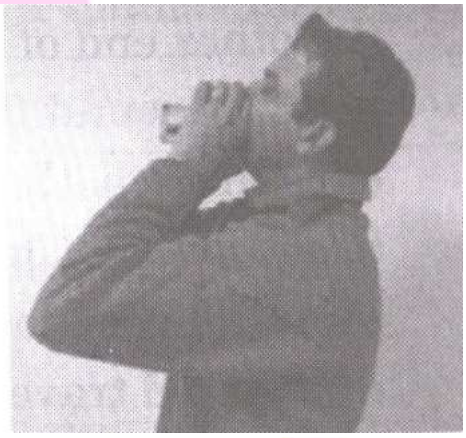
8. Name the organ in human that produces sound. How does it work?

In humans, the sound is produced by the voice box or larynx. The voice box has two vocal cords stretched across it, in such a way that is leaves a slit for the passage of air. When the lungs force air through slit, the vocal cords vibrate to produce sound.

9. Prove that sound needs a medium for propagation.

Take a metal glass tumbler. Place a cellphone in it. Ask your friend to give ring on this cellphone. Listen to the ring carefully. Now surround the rim of the tumbler with your hands. Put your mouth on opening between your hands. Indicate to your friend to give a ring again. Listen the ring while sucking air from the tumbler. You will not listen any sound. This activity shows that sound requires a medium to propagate.



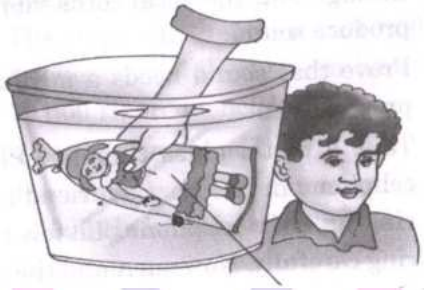


10. What do you mean by vacuum? What happens to the loudness of sound in vacuum?

The decreasing amount of air causes decrease in the loudness of sound. When air is removed completely form a vessel, it is said that there is a vacuum. If all the air is sucked form the vessel, the sound would stop completely. The sound cannot travel through a vacuum.

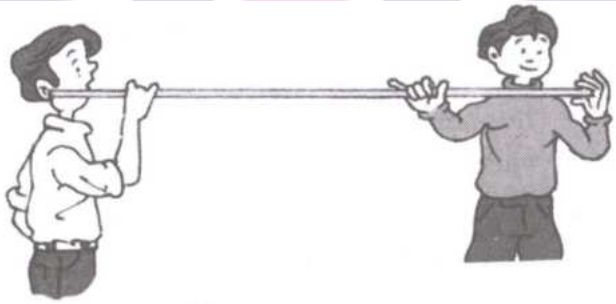
11. Prove that sound can travel through the liquids.

Take a bucket, fill it with clean water. Take a small bell in one hand. Shake the bell inside the water to produce sound. Place your ear gently on the water surface. You can hear the sound. It indicates that sound can travel through liquids.



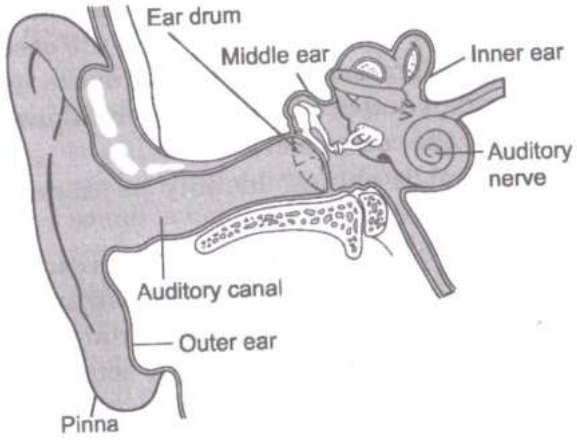
12. Prove that sound can travel through solids also.

Take a long metal rod or a metre scale and hold its one end to your ear. Ask your friend to gently scratch or tap at the other end of the metal rod. You can hear the sound. The sound reaches your ear through the solid rod. The other friends cannot hear the sound because sound is very low. This activity shows that sound travels in solids also.



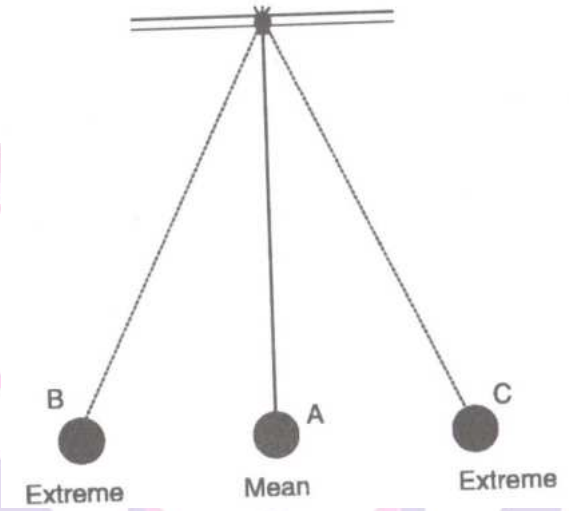
13. How do human being hear the sounds?

The hearing organs in humans are ears. Ears have a thin stretched membrane called eardrum. When ears receive sound, it enters down the ear canal and reach eardrum. Vibrations of sound vibrate the eardrum and it sends vibrations to inner ear from which vibrating are sent to brain for interpretation of sound.



14. What do you mean by an oscillatory motion?

The to and fro motion of the object is called vibration. This motion in either side of the object form its mean position is also called the oscillatory motion.



15. What is frequency? How does it affect the quality of sound?

The number of oscillations per second is called frequency. Its unit is hertz. A frequency of 1 Hz is one oscillation per second. The frequency determines the shrillness of sound. It is also called pitch of sound. The high frequency makes the pitch high and if the pitch is low, the frequency is less.

16. What are the two important properties of sound?

(i) **Amplitude :** It is the maximum displacement from the mean position of an oscillatory body. It controls the loudness of a sound; more the amplitude, more loud the sound is.

(ii) **Frequency :** The Number of oscillations in one second is called frequency. It controls the pitch of the sounds. High pitched sound means high frequency.

17. What do you mean by noise and musical sound?

Noise : The unpleasant sounds are called noise. It is unwanted sound. It is harmful to our ears.

Musical Sound : The sound which produces pleasant sensations is called musical sound. It is produced by various musical instruments.

18. What is noise pollution?

Presence of unwanted and excessive sounds in the environment is called noise pollution. It causes discomfort to us. Excessive sounds are produced by honking of horns, loudspeakers, crackers and machines.

III. Short Answer Type Questions- I

1. We have a stringed musical instrument. The string is plucked in the middle first with a force of smaller magnitude. In which case would the instrument produce a louder sound? (NCERT Exemplar)

It will create louder sound in case of string stretched with a greater force because amplitude is greater in this case and loudness depends on the amplitude. Greater will be the loudness if greater is the amplitude.

2. Compare the sound of drum and whistle.

The frequency determines the shrillness or pitch of a sound. A drum vibrates with low frequency. Therefore, it produces low pitched sound. Whistle has a high frequency and therefore, produces a sound of higher pitch.

3. What is the difference between noise and musical sound?

Unpleasant sounds are called noise and the sounds that seem pleasing to the ear are called musical sounds.

4. What is ultrasound? What are its uses?

Sound frequencies higher than 20,000 Hz are called ultrasound. It is used as diagnostic tool in medical science. It is also used to relieve pains in joints, muscles. It is used to detect flaws in metal and structures, and to test the thickness of various parts.

III. Short Answer Type Questions- II

1. List three sources of noise pollution in your locality.

Sources of noise pollution are : (i) Horns of vehicles (ii) Loudspeakers of temples (iii) Generators running without silencers.

2. A simple pendulum makes 10 oscillations in 20 s. What is the time period and frequency of its oscillations?

Given, number of oscillations = 10

Time taken = 20 s

As, we know that the number of oscillations per second is frequency.

Frequency = number of Oscillations / time taken

$= \frac{10}{20} = 0.5\ Hz$

Time period $\frac{1}{Frequency} = \frac{1}{0.5} = 2\,s$

3. Suggest three measures to limit noise pollution in your locality.

The measures to limit noise pollution in our locality are given as:

(i) The industries which produce noise should be set up away from the residential areas.

(ii) The television and the music systems should be run at low volumes.

(iii) The aircraft engines, transport vehicles, industrial machines and home appliances must be installed with silencing devices.

4. Which part of the following objects vibrates and sound is produced?

(i) Ringing of a sound bell

(ii) Buzzing of insects

(iii) Bursting of balloon

(iv) Brushing of table

(v) Playing a sitar

(vi) Dholak

(vii) flute

(i) Vibration of metal surface

(ii) Flapping of wings

(iii) Air vibrates to produce sound.

(iv) Vibrations of membrane

(v) Vibrations of strings

(vi) Stretched membrane

(vii) Air column

5. What is hearing impairment? How do people over come this problem?

Hearing impairment means not being able to hear properly. Partial disability is generally the result of a disease, injury or age. Children with impaired hearing need special care by learning sign language. Technological devices for the hearing impaired have made it possible for such persons to improve their quality of life.

6. What is frequency? How does it affect the quality of sounds?

The number of oscillations per second is called frequency. Its unit is Hertz. Frequency determines the shrillness of sounds. The high frequency makes the high pitch and if the pitch is low, the frequency is less. High pitched sound (females) is shrill whereas low pitched sound (males) is hoarse.

7. Define :

(i) an oscillation (ii) Hertz

(i) Oscillation : The to and fro motion of an object is called vibration. This motion is also called oscillatory motion.

(ii) Hertz : The number of oscillations per second is called the frequency in Hertz (Hz). A frequency of 1 Hz is one oscillation per second.

I. Long Answer Type Questions.

1. The townhall building is situated close to Boojho's house. There is a clock on the top of the townhall building which rings the bell every hour. Boojho has noticed that the sound of the clock appear to be much clearer at night. Explain.

We know that speed, pitch, loudness all are initiated with a vibration. During the day, there are number of vibrations around us. So, the sound coming from the clock gets disturbed and amplitude of vibrations becomes small. But during the night, there are not such multiple vibrations in the environment. So, sound is more clear. Further, the dew factor at night increases the speed of sound as moisture level increases.

2. How can noise pollution be controlled?

Presence of excessive noise in the surrounding may cause noise pollution, which is harmful to human health. Here are some measures to limit noise pollution :

(i) Noise producing industries should be set up away from residential areas.

(ii) Silencing devices must be installed in aircraft engines, transport vehicles, industrial machines and heavy appliances.

(iii) Use of automobile horn should be minimized.

(iv) TV and music system should be run at low volumes.

(v) Trees must be planted along the sides of the roads and around buildings to cut down the sounds reaching the residents.

II. Long Answer Type Questions.

1. Name some musical instruments and other vibrating parts in a tabular form.

S.No	Musical Instruments	Vibrating Part Producing Sound
1	Veena	Stretched string
2	Tabla	Stretched membrane
3	Flute	Air column
4	Sitar	Stretched string
5	Mridangam	Stretched membrane
6	Kartal	Air column
7	Drum	Stretched membrane
8	Dholak	Stretched membrane

2. Write the applications of the ultrasound.

(i) Ultrasound is used as diagnostic tool in medical science.

(ii) It is used to relieve pains in joints and muscles.

(iii) It is used to detect flaws in metals and structures.

(iv) It is used to test the thickness of various parts.

3. How does loudness of sound is affected by amplitude?

Loudness of sounds is proportional to the square of amplitude of the vibrations producing the sounds. If the amplitude becomes twice, the loudness increases by a factor of four. The unit of loudness is decibel (dB). The sound above 80 dB becomes physically painful. The loudness of sound depends on the amplitude. When the amplitude of vibration is large the sound produced is loud, when the amplitude is small the sound produced is feeble.

4. How does shrillness or pitch is affected by frequency?

The frequency determines the shrillness or pitch of sound. If the frequency of the vibration is higher, we say that sound is shrill and has a higher pitch. If the frequency of vibration is lower, we say that the sound has a lower pitch. For example, a drum vibrates with a low frequency, therefore, it produces a low pitched sound; a whistle has a high frequency, and therefore produces sound of higher pitch. A bird makes a higher pitched sound then roar of a lion. However, the roar of a lion is very loud, while the sound of the bird is quite feeble.

5. What are the methods of control noise pollution?

Methods of controlling noise pollution are;

(i) By reducing the sources of loud noise.

(ii) TV and Radio should be played at the low volumes.

(iii) Trees should be planted. These help in reducing noise.

(iv) The use of loud speaker should also be avoided.

(v) Blowing of horns should be avoided

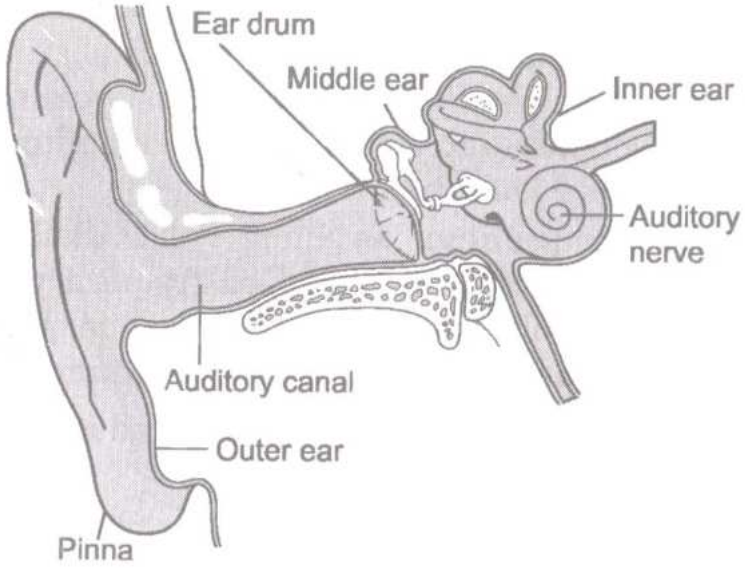
6. Explain the structure and function of human ear.

There are following parts of human ear.

(i) **Outer ear :** It is outer part of the ear. It has a canal. At the end of canal stretched membrane is attached. This membrane is called eardrum. The sound waves passes through canal and eardrum starts to vibrate.

(ii) **Middle ear :** There are three bones in middle ear. These bones are lined together and attached to the ear drum. These bones receive vibrations from ear drum and pass it to the inner ear.

(iii) **Inner ear :** The inner ear receive the vibration from the three bones of middle ear, which are changed into nerve impulse. These impulses are carried to the nerve by auditory nerve. The brain interprets impulses. In this way our ear can hear the sound.



7. Write any five sources of noise in your surroundings.

Five sources of noise are;

(i) Noise is produced by traffic.

(ii) Noise produced by coolers, mixer-grinder etc.

(iii) Loud sound of TV, radio etc.

(iv) Loud music in marriages and other religious functions.

(v) Noise created by construction works in our surroundings.

(vi) Sound produced by crackers.

III. Long Answer Type Questions.

1. How is sound produced and how is it transmitted and heard by us/

Sound is produce due to the to and fro or back and forth motion of an object known as vibration, when a tightly stretched band is plucked, it produces sound. When it stops vibrating, it does not produce sound.

Sound waves enter the ears and travel down a canal at the end of which is a thin, tightly stretched membrane called eardrum. As the sound wave strikes the eardrum, it vibrates and the vibrations reach the inner ear which sends signals to the brain. The brain interprets the signals and we hear the sound.

I. High Order Thinking Skills (HOTS) Questions.

1. Among water and steel, in which medium will the sound wave travel faster?

The sound will travel faster in steel because speed of sound is fastest in solids.

2. Explain why babies have feeble sound.

Babies have feeble sound due to the small amplitude of their sound.

3. Different bees produce buzzing sounds of different pitches. What affects the pitch of the bee's buzzing sound?

The faster the bee vibrates its wings, the greater the frequency of the sound.

4. Why do we not hear the sound of an explosion on the surface of the moon?

There is no atmosphere on the moon and sound waves need a medium to travel, so we cannot hear the sound on the moon.

5. A stretched string on being set into vibrations, produces the audible sound. Explain how.

A stretched string on being set into vibrations forces the surrounding air to vibrate and this vibrating air then affects our eardrum and produces an audible sound.

6. Astronauts in outer space have to use radios to communicate with one another. Why?

In outer space, there are no gases to help transmit sound. To communicate with one another, astronauts make use of electromagnetic waves such as radio waves which can travel through vacuum.

7. Explain the process, how bats use ultrasonic waves to catch a prey.

Since, the ultrasonic waves produced by the bats are high pitched which are not heard by the human beings, so, these ultrasonic waves after striking the insect send back on echo which is heard by the bat and finally it gets over on the insect and catches it.

8. Explain in brief about eardrum. Also explain how it plays an important role in hearing.

As, we all hear sound through our ears. The moment like eardrum when sound enters in outer part of ear then it travels down a canal at the end of which a thin membrane is stretched tightly which is called the eardrum. It performs an important function. The stretched rubber sheets like eardrum sound vibrations which make them vibrate. In this way the eardrum sends vibrations to the inner ear and the signal goes to the brain.

II. High Order Thinking Skills (HOTS) Questions.

1. The town hall building is situated close to boojho's house. There is a clock on the top of the Town hall building which rings the bell every hour. Boojho has noticed that the sound of the clock appears to be much clearer at night. Explain.

The noise level is quite low at night. Therefore, the sound of the clock appears much clearer at night than in the day.

2. If there is an explosion on the moon. Would it be heard on the earth?

No, Explosion on the moon will not be heard on the earth because the space between earth and moon is vacuum and sound cannot travel through vacuum.

Value Based Questions

1. Presence of excessive or unwanted sounds in the environment is called noise pollution. List some sources of noise pollution. What are the harms of noise pollution. What are the measures to control noise pollution?

Sources of Noise Pollution : Major sources of noise pollution are—sounds of vehicles, explosions including bursting of crackers, machines, loudspeakers etc. At home high volume of television, transistor, radio and sound of some kitchen appliances, desert cooler etc. all contribute to noise pollution.

Name of Diseases caused by Noise Pollution : This noise pollution may cause many health related problems. Lack of sleep, hypertension, anxiety and many more health disorders may be caused, such as impairment of hearing.

Measures to limit Noise Pollution : For this, silencing devices must be installed in machines. All noisy operations must be conducted away from any residential area. TV and music should be run at low volumes. Trees must be planted along the roads and around the buildings to cut down the sounds.

2. Last Monday, Anita, with her parents, was going to the market by an auto rickshaw. On her way while taking a left turn, they heard the horn of speeding truck towards the turn. Suddenly, the auto rickshaw driver stopped his vehicle by applying brake. Thus, by adopting the precautionary measure by blowing horn, the truck driver saved the lives.

(i) The loudness of horn depends on what factor?

(ii) Mention the values displayed by both the drivers.

(i) The factor on which the loudness of horn sound depends is the amplitude of vibration of horn.

(ii) The values displayed by both the drivers are awareness and sensitivity.

Skill Based Questions.

1. Observe the following musical instruments and name them.

(i)

(ii)

(iii)

(iv)

(i) Tabla (ii) Harmonium

(iii) Sitar (iv) Flute

2. Name the vibrating parts of the following musical instruments;

(i) Tabla **(ii) Harmonium**

(iii) Sitar **(iv) Flute**

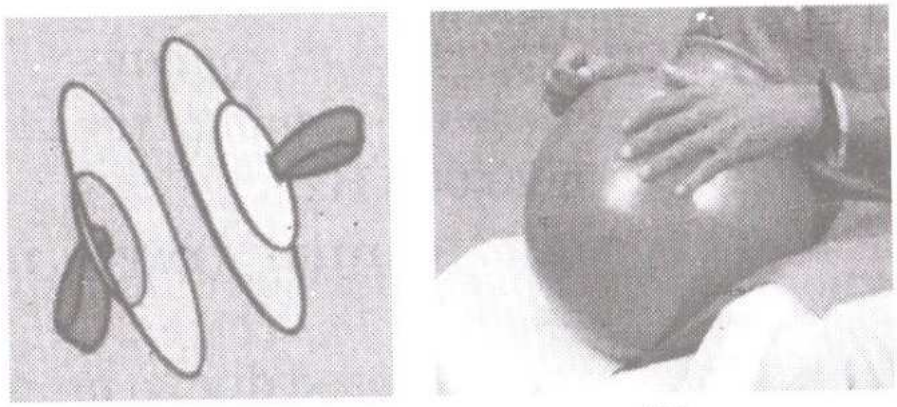
(i) Table : Stretched membrane

(ii) Harmonium : Stretched membrane

(iii) Sitar : Stretched string

(iv) Flute : Air column

3. Observe the following figures and answer the following questions.



(a) (b)

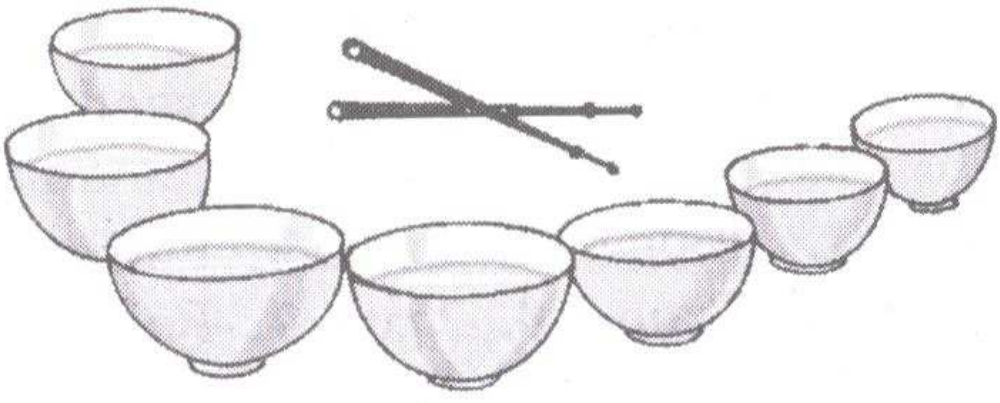
(i) Name the musical instruments.

(ii) How do they produce sound?

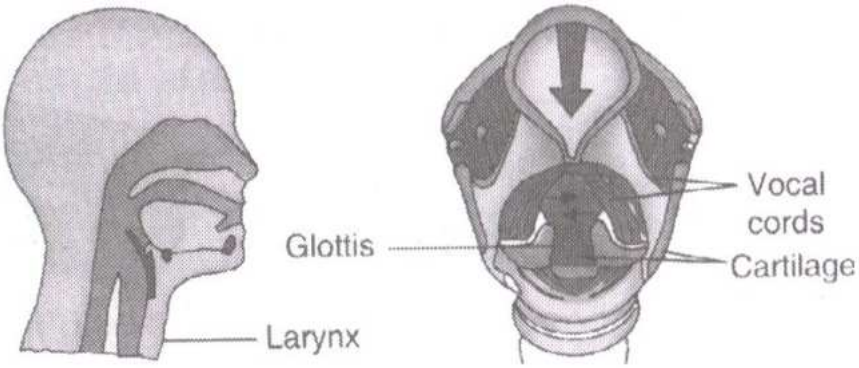
(i) (a) Manjira (b) Ghatam

(ii) These instruments produce sound when beaten or struck.

4. Draw a diagram to show jaltarang.



5. Draw a diagram of larynx of human. What is the other name of larynx?

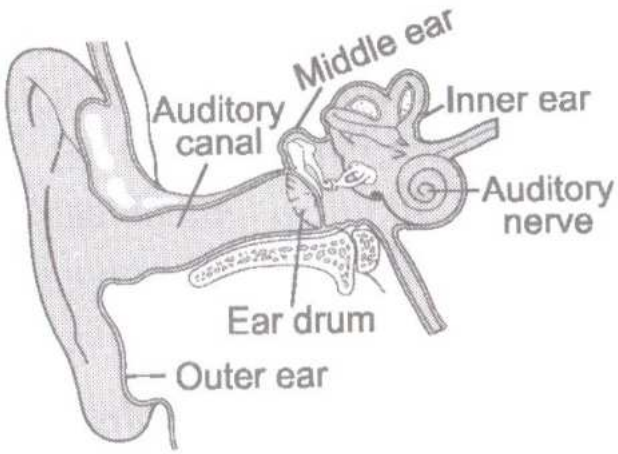


6. Draw a diagram of human ear and answer the questions.

(i) What are the three main parts of human ear?

(ii) Name the outer part of ear.

(iii) Name the stretched thin membrane of human ear.



(i) There are three parts of human are;

(a) Outer ear (ii) Middle ear (iii) Inner ear

(ii) Outer part of ear is called pinna.

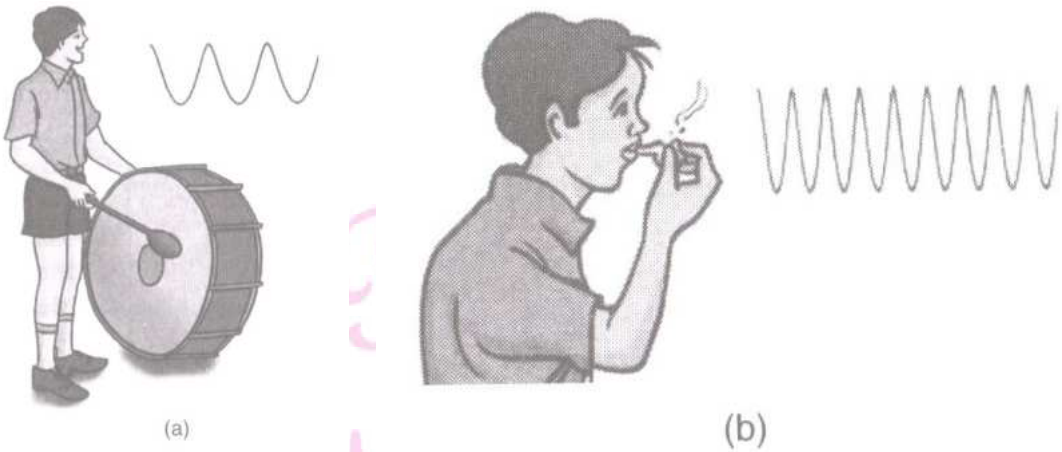
(iii) The stretched thin membrane of human ear is eardrum.

7. (i) Observe the following figures and identify them.

(ii) Which of these produces;

(a) Low pitched sound

(b) High pitched sound.



(a) (b)

(i) The figures are

(a) Drum (b) Whistle

(ii) (a) Drum produces low pitched sound.

(b) Whistle produces high pitched sound.

Cross word Puzzle

Across

1. The number of vibrations made by an object in one second

2. The outer ear

3. The refection of sound from a surface

4. Low frequency sound which we cannot hear

5. Sounds of frequency above 20,000 Hz

Down

3. The organ that sends vibrations to the inner ear

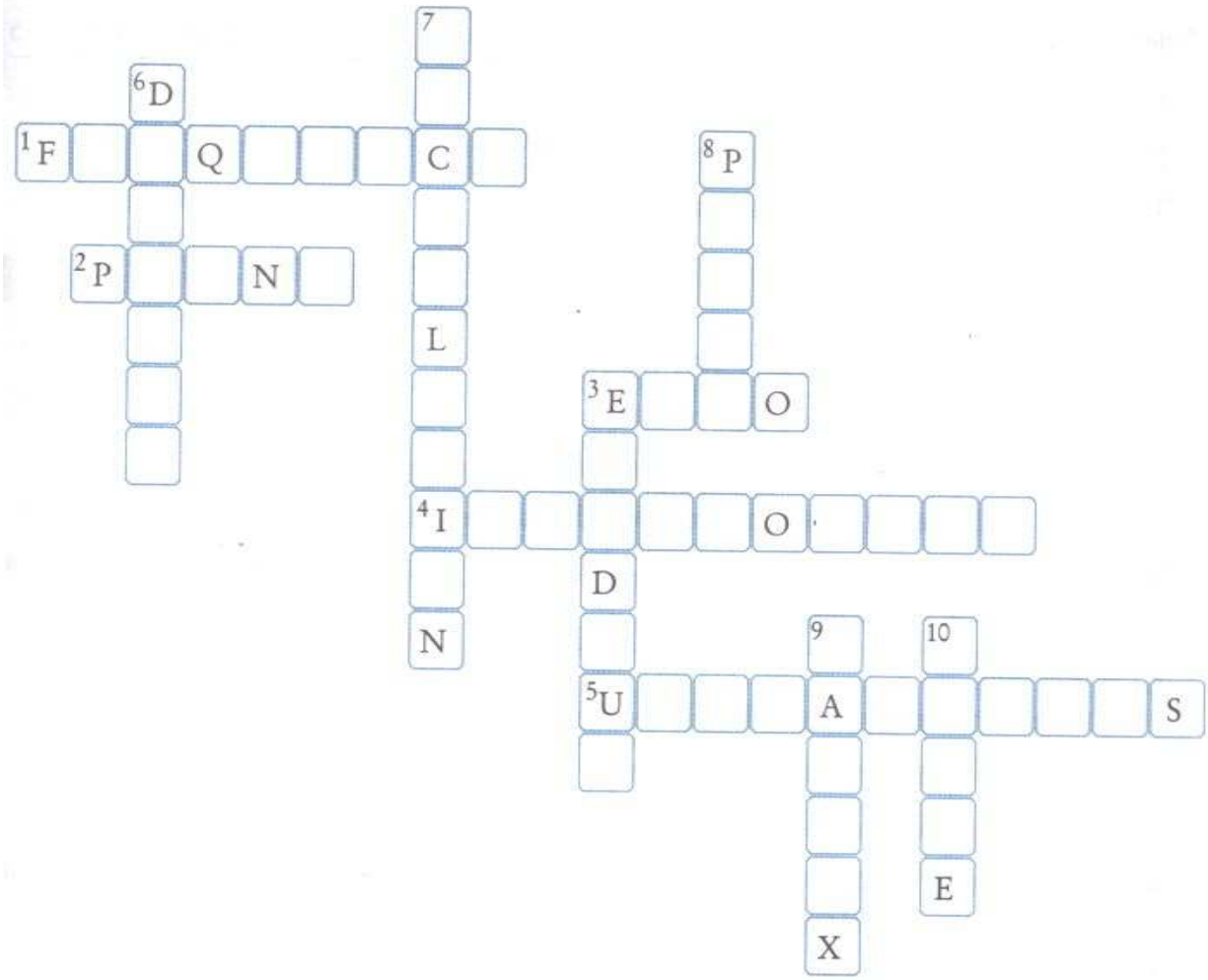
6. Unit for measuring loudness of sound

7. The to and fro motion of an objects

8. The sensation of frequency

9. The sound producing organ of our body

10. Loud, unpleasant sound



Across : 1. Frequency 2. Pinna 3. Echo 4. Infrasounds

Down : 3. Eardrum 6. Decibel 7. Oscillation 8. Pitch 9. Larynx