INTEXT QUESTION-ANSWERS

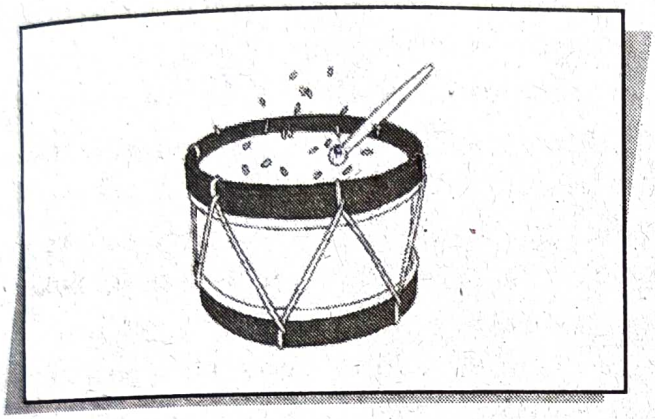
Questions

Q. 1. What is sound ?

Ans. Sound : *It is a type of energy that gives us the ability to hear.*

Q. 2. When grains are put on a drum after striking it with a stick, why grains start moving ?

Ans. When we beat the drum with a stick and put grains on it, then they start moving.



The reason for this is that when the drum is beaten with a stick, the surface of the drum (membrane) vibrates, from which the sound is produced. This vibration forces the grains to move.

Q. 3. Can a body produce sound without vibration ?

Ans. Sound can only be produced by vibrating objects.

Questions

Q. 1. Define the terms :

(a) Amplitude (b) Frequency (c) Time Period.

Ans. (a) Amplitude : *The maximum distance covered by an oscillating object from its mean position,* is called its amplitude.

(b) Frequency : *The number of oscillations per second is called the frequency of oscillation.* The unit of frequency is hertz.

(c) Time Period : *The time taken to complete one oscillation, is called the time period of the vibrating object.*

Q. 2. When the ball of the pendulum is at rest position; what is the name of this position ?

Ans. When the ball of the pendulum is at rest then this position of ball is called mean position.

Q. 3. Name and define the unit of frequency.

Ans. Unit of frequency : The unit of frequency is Hertz.

Hertz : *If a pendulum completes one oscillation in one second, the frequency of pendulum is one hertz.*

Q. 4. What is the relation between time period and frequency ?

Ans. Time period and frequency are inversely proportional to each other.

$$i.e.\ \text{Frequency} = \frac{1}{\text{Time period}}$$

Questions

Q. 1. Can astronauts hear the sound on moon ? Why or why not ?

Ans. We know medium is necessary for the transmission of sound. But no medium (air) is present on the moon. So astronauts cannot hear sound on the moon because of the absence of medium.

Q. 2. Can sound travel through vacuum ? If not, demonstrate it by an activity.

Ans. Sound cannot travel through vacuum. A medium is necessary for the transmission of sound. We can confirm this fact through the following activity.

Activity : Take an electric bell and an air

tight bell jar made up of glass. Hang the electric bell in the bell jar. Attach the bell jar to a vacuum pump as shown in fig.

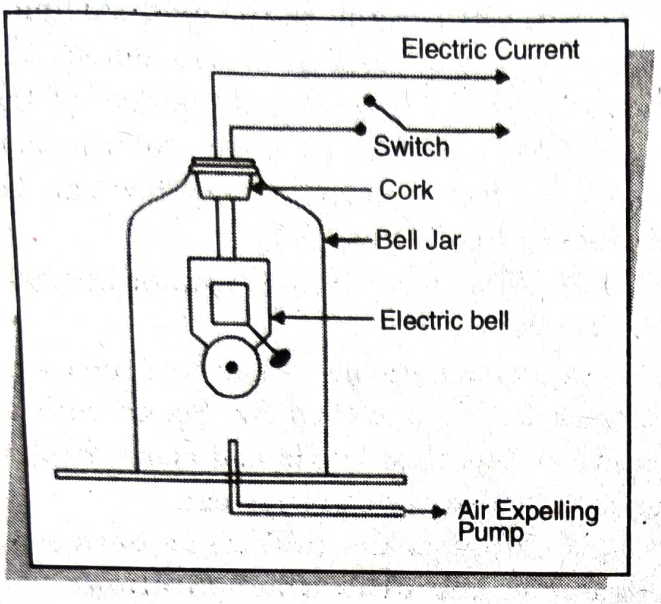
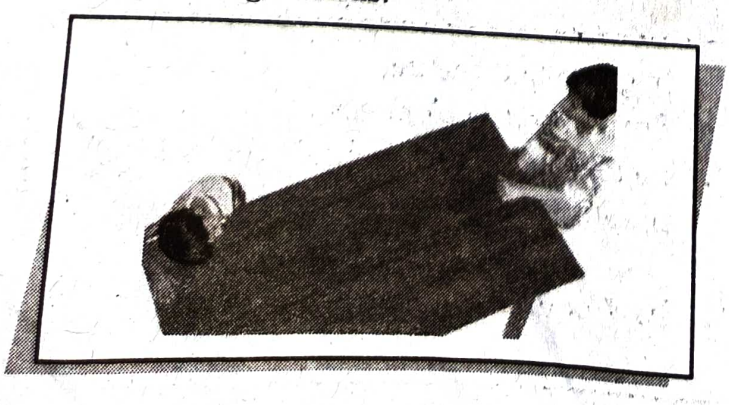


Fig. Sound cannot travel through vaccum

On pressing the bell switch you will hear its sound. Now run the vacuum pump. As the air in the bell jar slowly escapes, the sound of the bell becomes low, while the same electric current is passing through it. After some time when there is very little air left in the bell jar you will hear a very faint sound. If all the air in the bell jar is expelled, you will not be able to hear the sound of the bell. This proves that it is necessary to have a material medium for sound.

Q. 3. When you place your ear at one end of the table and your friend keeps on tapping the table on the other end. Can you hear the sound ? If yes, what conclusion did you draw ?

Ans. Yes, I will hear the sound. This can only be possible, if the sound travels through the wood. From this it is clear that sound travels through solids.



Q. 4. When you shake a bell in water, you hear the sound of the bell. What does it prove ?

Ans. Hearing the sound of the bell proves that the transmission of sound takes place through liquids. In this case the liquid is water.

Questions

Q. 1. What do you understand by the pitch and loudness of the sound ?

Ans. Loudness of Sound : Loudness of sound depends on the amplitude of the vibrations that produces the sound. Larger the amplitude of the vibrating object, the louder the sound produced by it.

Pitch or Shrillness of Sound : The shrillness or pitch of the sound depends on the frequency of the vibrating object. The higher the frequency, the higher the pitch of the sound. The pitch of different musical instruments is different. The pitch of the instrument has to be changed repeatedly to play different tunes.

Q. 2. Which sound has more pitch, sound of a child or an adult ?

Ans. The pitch *i.e.* shrillness of a child's voice is higher than the pitch of an adult's voice. The pitch of the sound is directly proportional to the frequency of the vibrating object. That is, the higher the frequency of the sound, the higher the pitch of the sound.

Q. 3. On which factor does the loudness of the sound depend ?

Ans. Factor on which Loudness of Sound Depends : The loudness of the sound depends on the amplitude of the vibrations that produces the sound. The intensity of the sound is directly proportional to the square of the amplitude of the vibrations.

Loudness of sound $\propto$ (amplitude)^2

Example : If the amplitude of the sound vibrations is doubled, the intensity of the sound will become four times and if the amplitude is tripled, the intensity will increase by nine times.

Q. 4. Name three characteristics of sound.

Ans. Characteristics of sound : Sound has the following three characteristics :

1. Loudness
2. Pitch
3. Timbre.

On the basis of these characteristics we can identify someone from his or her voice without seeing him or her.

Questions

Q. 1. What is ultrasound and what are its uses in medical treatments ?

Ans. Ultrasounds : Sounds that have a frequency greater than 20,000 Hz are called ultrasounds. This sound is not audible to humans. Some animals like dogs, cats and bats can hear such sounds and hunt their prey by using ultrasounds.

Use of ultrasounds in the medical field : By using ultrasounds, we can detect the abnormalities in the internal organs of the human body and treat them. Information about the foetus during pregnancy can be obtained using ultrasounds.

Q. 2. What is audible frequency range for humans ?

Ans. Human Audible Frequency Range lies between 20 Hz to 20,000 Hz. Sound with a frequency less than 20 Hz and above 20,000 Hz is inaudible to the human ear.

Q. 3. What is the difference between infrasonic and ultrasonic vibrations ?

Ans. Difference between ultrasonic and infrasonic vibrations :

Ultrasonic Vibrations	Infrasonic Vibrations
1. Ultrasonic vibrations are vibrations with a frequency higher than the human audible range.	1. Infrasonic vibrations are vibrations with a frequency less than the lower limit of human audible range.
2. These vibrations have a frequency greater than the upper limit of the audible range of the human ear *i.e.* greater than 20,000 Hz.	2. These vibrations have a frequency less than the lower limit of the audible range of the human ear *i.e.* less than 20 Hz.
3. These vibrating sounds can be heard by dogs, cats and bats.	3. These sounds can be heard by elephants. The vibrations of volcanoes, earthquakes etc. are infrasonic in nature.

Questions

Q. 1. What is the difference between noise and music ?

Ans. Difference between Music and Noise :

Music	Noise
1. It gives good feeling.	1. It gives bad feeling.
2. It is a pleasant sound.	2. This sound is unpleasant.
3. It has nothing to do with health problems.	3. Listening to such sounds for a long time can cause health problems like blood pressure and heart disease.
4. Its vibration frequency is less than 80 dB.	4. Its frequency is greater than 90 dB.

Q. 2. What is noise pollution ?

Ans. Noise Pollution : Entry of any kind of undesirable inaudible high intensity (>90 dB) sounds into the environment becomes annoying and sometimes deadly for us and other living beings. It is called **noise pollution or sound pollution.** Listening to such sound for a long time causes disruption in mental activities.

Q. 3. What are the bad effects of noise pollution ?

Ans. Bad effects of noise pollution :

1. Listening to sound above 80 dB can harm our hearing ability.
2. Noise pollution increases blood pressure.
3. Staying in an environment with continuous noise pollution can also cause heart disease.
4. Noise pollution can cause insomnia, stress and restlessness.
5. Along with humans, animals are also affected by noise pollution.

Q. 4. How can you reduce noise pollution ?

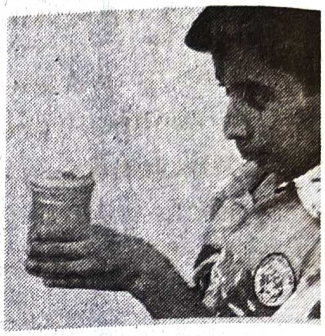
Ans. Methods to reduce noise pollution :

1. Pressure horn should be completely banned. It should be used only when necessary. Besides, there should be strict orders to install silencers in vehicles.
2. All factories should be outside residential areas.
3. Home appliances and factory machines should be lubricated from time to time. Their maintenance and repair should be done time to time.
4. Trees should be planted on both sides of the roads. These trees will absorb the sound.
5. Thick curtains should be used in houses. They reduce the intensity by absorbing the unnecessary sound.

Questions

Q. Explain the working of ear drum with an activity.

Ans. Activity : Take a plastic box. Cut off its both ends. Stretch a balloon on one end of



box and fasten it with a rubber band as shown in the figure. Now place some wheat grains on this stretched balloon sheet and ask your friend to speak at the other end of the box. You will see that those grains of wheat bounce up and down because the sound waves have caused vibrations in the grains. Our ear drum is also like the sheet of this balloon. Sound vibrations collide with the membrane of our ear and create vibrations in the membrane. Ear is a critical part of human body. It should be taken care of. We should not put any sharp object (pin, pen, pencil etc.) in our ear. By doing this, the ear drum can burst, which will make us deaf.

TEXTBOOK EXERCISES (SOLVED)

(A) Fill in the Blanks

1. Time taken by an object to complete one vibration is called ..... .
2. Sound requires a ..... to travel.
3. Sound travels fastest in ..... .
4. Hertz (Hz) is the unit of ..... .
5. Unwanted sound is called ..... .
6. Sound having frequency more than 20000 Hz is called ..... .
7. Shrillness of the sound is called ..... .

Ans. 1. time period, **2.** medium, **3.** solid, **4.** frequency, **5.** noise, **6.** ultrasound, **7.** pitch.

(B) Write True (T) or False (F)

1. Sound having frequency less than 20 Hz is known as Infrasonic. ☐
2. Sound can travel in vacuum. ☐
3. Sound having frequency more than 80 dB is harmful. ☐
4. Sound of lion has more frequency than the sound of a mosquito. ☐
5. Pitch of the sound depends upon amplitude of vibrations. ☐
6. Sound cannot travel through a string. ☐

Ans. 1. (T), **2.** (F), **3.** (T), **4.** (F), **5.** (F), **6.** (F).

(C) Choose the Correct Answer

1. The amplitude of the sound decides its .....

(*a*) Speed (*b*) Loudness
(*c*) Pitch (*d*) Source.

Ans. (*b*) Loudness.

2. Sound can travel in :

(*a*) Gases only (*b*) Liquids only
(*c*) Solids only (*d*) Gases, liquids and solids, all.

Ans. (*d*) Gases, liquids and solid, all.

3. When you hold the ringing bell with hand :

(*a*) Bell stops vibrating and stops ringing.
(*b*) Bell starts vibrating with inaudible frequency.
(*c*) No change in vibration
(*d*) Amplitude increases.

Ans. (*a*) Bell stops vibrating and stops ringing.

(D) Match Column 'A' with Column 'B'

Column 'A'	Column 'B'
1. Noise	(*a*) Unit of frequency
2. Larynx produces	(*b*) Human organ which sound
3. Hertz	(*c*) Loudness
4. Decibel	(*d*) Musical instrument
5. Flute	(*e*) Unwanted sound

Ans.

Column 'A'	Column 'B'
1. Noise	(*e*) Unwanted sound
2. Larynx produces	(*b*) Human organ which sound
3. Hertz	(*a*) Unit of frequency
4. Decibel	(*c*) Loudness
5. Flute	(*d*) Musical instrument

(E) Very Short Answer Type Questions

Q. 1. Name the organ which produces sound in humans.

Ans. Larynx.

Q. 2. What is difference between noise and music ?

Ans. Music is sound that has a pleasant effect while noise is an undesirable sound that is unpleasant to the ears.

Q. 3. Define one vibration.

Ans. One vibration takes place when body starts vibrating from its equilibrium (mean) position to one extreme position and then to another extreme position and back to the equilibrium (mean) position.

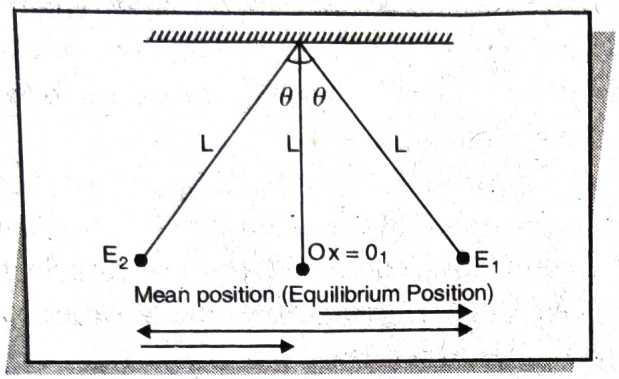


Fig. Motion of simple pendulum bob.

Q. 4. What are ultrasonics and infrasonics ?

Ans. Ultrasonic : *Sounds with a frequency greater than 20,000 Hz (or 20 kHz) are called ultrasonic.* Bats, dolphins, dogs and cats can hear ultrasound.

Infrasonic : *Sound having frequency less than 20 Hz is called infrasonic.* Whales and elephants produce infrasonic sound. Before the main sound of an earthquake, a low-frequency infrasonic sound is produced, which some animals can hear and they get disturbed and this way they alert the other animals.

Q. 5. Name the units for measuring loudness and pitch.

Ans. Unit of measurement of sound intensity : Decibel (dB)

Unit of measurement of pitch of sound : Hertz (Hz).

Q. 6. What is the relation between frequency and time period ?

Ans. $\text{Frequency} = \dfrac{1}{\text{Time Period}}$

(F) Short Answer Type Questions

Q. 1. A pendulum oscillates 50 times in 5 seconds. Find its time period and frequency.

Sol. Given, time taken to complete 50 oscillations = 5 seconds

$\therefore$ Time taken to complete 1 oscillation

$$= \frac{5}{50} = 0.1 \text{ sec}$$

i.e. Time Period $= 0.1$ sec **Ans.**

$$\text{Now, Frequency} = \frac{1}{\text{Time Period}}$$

$$= \frac{1}{0.1}$$

$= 10$ Hz **Ans.**

Q. 2. 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 vibration ?

Sol. Frequency = 500 vibrations per second = 500 Hz

Time Period = ?

We know that, Time Period

$$= \frac{1}{\text{Frequency}}$$

$$= \frac{1}{500}$$

$$= \frac{2 \times 1}{2 \times 500}$$

$= 2 \times 10^{-3}$ sec. **Ans.**

Q. 3. What is audible and inaudible frequency range for human ?

Ans. The range (limit) of sound audible to the human ear = 20 Hz to 20,000 Hz

The range of sound inaudible to the human ear is below 20 Hz and above 20,000 Hz

Q. 4. Define the following relating to sound :

(*a*) Loudness (*b*) Pitch (*c*) Quality (or timbre).

Ans. (*a*) Loudness of Sound : The loudness of sound depends on the amplitude of the vibrations that produces the sound. The larger the amplitude of the vibrating object, the louder the sound produced.

(b) Pitch or Shrillness of Sound : The shrillness or pitch of the sound depends on the frequency of the vibrating object. The higher the frequency of the sound, the higher the pitch of the sound. The pitch of different musical instruments is different. The pitch of the instrument has to be changed repeatedly to play different tunes.

(c) Quality or Timbre of Sound : Quality or Timber of Sound is that quality which enables us to distinguish one sound from the other sound when both have same pitch or intensity. That sound which is more pleasant has good quality

(G) Long Answer Type Questions

Q. 1. List sources of noise pollution in your surroundings. Explain why noise pollution is harmful for humans.

Ans. Sources of noise pollution :

1. Noise of vehicles and their pressure horn.
2. Loudspeakers with high gain.
3. The sounds of factory machines.
4. Fireworks.
5. TV, Music player and radio.
6. Air conditioners
7. Sound of kitchen appliances like mixer etc.
8. Street vendors selling their goods.

Harmful effects of noise pollution :

1. Listening to sound with intensity more than 80 dB can partially destroy our hearing.
2. Lack of sleep.
3. Continuous noise pollution can cause restlessness and heart diseases.
4. Noise pollution increases the possibility of increasing blood pressure.
5. Noise pollution can cause stress and makes it difficult to concentrate.

Q. 2. Describe the construction of human ear and explain its working.

Ans. Construction of human ear : Human ear has three parts :

(1) Outer ear, (2) Middle Ear, (3) Inner Ear :

(1) Outer Ear : The outer ear is similar to funneland is called pinna. We can see only this part of the ear. When the sound enters in it, it travels to reach the stretched membrane. This membrane is called eardrum. As the sound hits the membrane, it starts vibrating. These vibrations are sent forward to the middle ear.

(2) Middle Ear : There are three bones in this part of the ear : (*i*) malleus, (*ii*) Incus, (*iii*) Stapes. These are interlocked with each other. From here the vibrations are sent to the inner ear.

(3) Inner Ear : This is the innermost part of the ear. It contains cochlea tubes. These are semicircular tubes and are filled with fluid. This part is responsible for balance. From here the vibrations are sent to the brain, which help us in recognition of the sound.

Working of the human ear : The human outer ear is called 'pinna' or ear lobes which

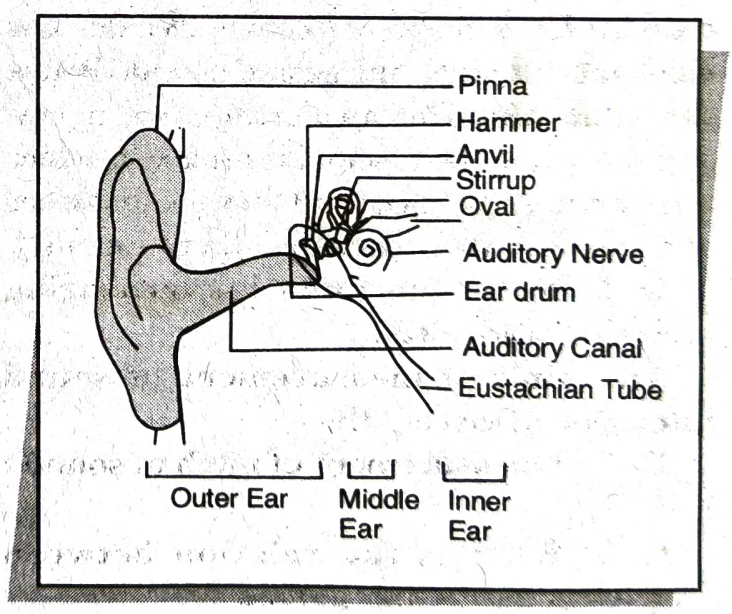


Fig. Inner part of Human Ear

collect sound from the surrounding environment. This collected sound passes through the ear canal and falls on the thin membrane at the end of the ear canal. Here, due to the compression of the medium, the pressure on the outside of the membrane increases which pushes it inwards. On arrival

of rarefactions, the eardrum moves outwards. Thus the membrane starts to vibrate. The three bones in the middle ear (hammer, anvil and stirrup amplify

these vibrations and transmit these pressure changes to the inner ear. Here these pressure changes are converted into electrical signals and sent to the brain through the auditory nerve. The brain interprets them acoustically.

Q. 3. 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 seen later explain why ?

Ans. The speed of light is 3×10^8 ms^{-1}, while the speed of sound is 340 ms^{-1}. Therefore, even if lightning and thunder happen at the same time and at the same distance, we see the flash of lightning first and the sound of thunder is heard later.

Q. 4. List some methods to reduce noise pollution.

Ans. Methods to reduce noise pollution :

1. Pressure horn should be completely banned. It should be used only when necessary. Besides, there should be strict orders to install silencers in vehicles.
2. All factories should be outside residential areas.
3. Home appliances and factory machines should be lubricated from time to time. Their maintenance and repair should be done time to time.
4. Trees should be planted on both sides of the roads. These trees will absorb the sound.
5. Thick curtains should be used in houses. They reduce the intensity by absorbing the unnecessary sound.

Q. 5. Can sound travel through solids. If yes explain with an activity.

Ans. Refer Q. 3 under the heading "Question" Page No. 50.