SOUND

Throughout the day we are constantly exposed to different sounds. For example, peoples talk, birds chirping, cries of animals, sounds of autos, motorbikes, buses, lorries, tractors, trains and music from loudspeakers at public places, television. Sound is an unavoidable and integral part of our lives. We are always surrounded by sound. It is almost omnipresent. Sound plays an important role in our lives. It helps us to easily communicate with each other.

Make a list of sounds that you get to hear in your surroundings.

- How are these sounds produced?
- How do sounds travel from one place to another?
- Are we able to hear all sounds in nature?

We will try to seek answers to some of these and similar questions in this chapter.

Production of sound

Activity-1

Listening to sound and predicting its source

Let us sit quietly for a while and listen to sounds of objects, animals. Prepare a list of sounds that we hear and the sources from which they might have originated. Write them in table-1.

Table 1

Sound heard	Source of Sound
Feeble barking	Dog from some distance
Bell ringing	

Activity-2

Identifying different sounds

Make a student to stand at the black board such that his face is turned towards the black board and ask other student in the class to make different sounds. The student at the board should tabulate the sounds he heard and sources of those sounds as shown in table-2.

Table-2

S.No.	Sound heard	way of producing Sound
1.	Gala Gala	A few stones ratteling in a metal box
2.	Eela (whistling sound)	A student has produced the sound from her/his mouth
3.		Some one was beating the table tab with a Scale.
4.		Some one was the thumping the ground with shoes
5.		
6.		

- How does the student at the black board guess the source of sound without actually seeing the source?

You might have observed many other sources of sound in your daily life. Try to listen and identify some more sources of sound and prepare a

list.

- How do objects produce sound?

Vibrating bodies produce sound

- What happens when objects made of metals are hit by a hammer or fall down from a height on a concrete floor?
- How does a flute or a whistle produce sound?
- What would you feel if you touch a body while it is producing sound?

Activity-3

Vibrating body produces sound

Take a brass bell (bell used in pooja room or in your school). Ring the bell and listen to the sound carefully. Now hold the bell tightly with your hand as shown in fig-1 and ring it again.

- Do you hear sound from the bell?
- Is there any change in the sound produced in the two situations?

How do you feel when you touch the ringing bell? Remove your hand and ring it again. Do you hear a different sound? Why?

Fig-1: Observing vibrations of bell when it is producing sound

Let us do following activities

1. Fix a rubber band tightly on an empty matchbox. (See fig-2). Pluck the rubber band and keep it close to your ear.

Fig-2: Listening to sound from match box tied with rubber band

→ Do you hear any sound? Do you feel any vibration in your hands?

2. Blow air into papers of your notebook as shown in fig-3. What happens? Does the action produce any sound? Do you find any vibrations in the note book?

Fig-3: Blowing air into papers

3. Fill a plate with water and let the water settle. Strike the rim of the plate with a spoon as shown in fig-4. What do you observe? What do you hear? Where do you find vibrations in this case?

Fig-4: Striking the rim of a plate with a spoon

4. Put a hack-saw blade in between a table and a brick as shown in the figure-5 and press it and leave it abruptly. What happens? Does it produce sound? What is the state of the hack-saw blade while it is producing sound?

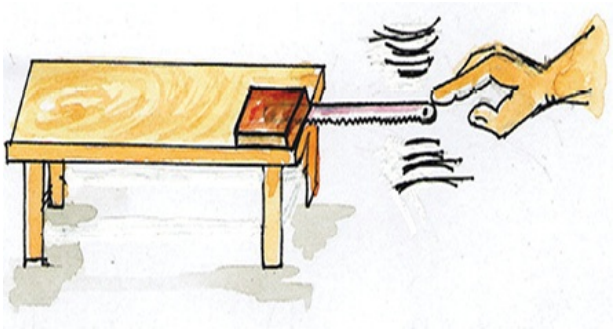


Fig-5:Sound produced by a vibrating hack- saw blade

- What have you observed while doing the above activities?
- What changes took place in those objects?

You must have noticed that objects vibrate while they are producing sound. You can feel these vibrations if you touch the objects. We are able to observe the vibrations of the plate and papers of the book. We have also observed vibrations of the hack-saw blade. Thus, we can conclude that a vibrating body produces sound.

But there are certain instruments which produce sound though we cannot see any vibrations in the instruments like in flute and clarinet etc.

- How do they produce sound?
- Is it possible to produce sound without vibrations?
- Does every vibrating body produce sound?
- Does sound have energy?

Let us find out:

Activity-4

Sound has energy

Take a plastic bottle and a cell phone. Cut the top of the bottle so that it looks like a glass. Play songs on the mobile phone in high volume and place it in the bottle. Close the mouth of bottle with a balloon using rubber band so that it covers the bottle as shown in the fig-6 and stretch it tightly so as to behave like a diaphragm. Place some sugar crystals or small size of sand particles on the balloon diaphragm and observe the movement of particles. Do the same activity after removing the phone from the bottle. What do you notice?

Fig-6: Sound has energy

When there is no cell phone inside the bottle, sand particles on the diaphragm remain stationary. While the cell phone plays songs inside the bottle, the diaphragm vibrates which can be seen through dancing of sand particles. The sound produced by cell phone inside the bottle is responsible for these vibrations. Thus, sound has energy to make sand particles vibrate on the diaphragm.

Musical instruments

You might have observed many musical instruments like Tabala, Flute, Harmonium and Gitar. The sounds produced by these instruments are distinct. It is easy for us to identify which sound is coming from which instrument.

- How do they produce sound?
- Why there is a difference between the sounds produced by various musical instruments?
- Which part of these instruments is responsible for production of sound?



Fig-7

Let us do

List out the names of musical instruments and mention the vibrating part of each instrument, write them in table-3.

Table 3

Name of instrument	Vibrating part of it
Tabala	Membrane, air inside hollow body

Have you named all the vibrating parts for each musical instrument? For example, in tabala, not only the stretched membrane but the air inside the hollow body also vibrates.

- Can you name the instrument for which more than one part is responsible for the production of sound?
- How do you compare the production of sound in a flute and sound produced in a water tap when it is turned on, just before the water flows out of it.

Activity-5

Producing a sound that resembles sound of rainfall

Start clapping with fore finger on left hand palm, add the middle finger and clap again, then ring finger and lastly small finger successively and reverse the process gradually. If all the students in your class do it simultaneously the sounds produced would resemble the onset and stopping of rainfall.

Activity-6

Observing the changes in sound

Take 4 or 5 metal glass bowls or tumblers. Fill them with water in decreasing order. Strike gently each bowl or tumbler with a spoon. What do you hear? (This is a jalatarang) (see figure-8)

Fill the bowls or tumblers with equal amounts of water, strike each bowl like in above case and listen to the sound.

- What difference do you notice in the sound produced?
- Why is there a variation in the sound produced due to change in the water level of a bowl?

Fig-8 : Jalatarang

Thus we conclude that sounds are produced by vibrating bodies and the air that passes through orfices of the instruments.

Do you know?

Bismillah Khan, the most outstanding and world-famous shehnai player, had attained astonishing mastery over the instrument. He was born in a small village in Bihar about 80 years ago. He spent his childhood in the holy city of Varanasi, on the banks of the Ganga, where his uncle was the official shehnai player in the famous Kasi Viswanath temple.

Bismilla Khan

Chitti babu

Chitti Babu (October 13, 1936 - February 9, 1996) was a renowned classical musician from India, and arguably one of the greatest Veena artists, in the field of Karnatic Music a speciality of South India. He became a legend in his own lifetime. His name was synonymous with the musical instrument Veena, and he was and still is known in the Karnatic Music world, simply as Veena Chitti Babu.

Sounds produced by human beings

We know that all animals produce sound to communicate with other animals. Human beings use these sounds more effectively. Sounds produced in particular order and manner constitutes our speech. This order in production of sound is different for different languages or communication processes.

Honeybee makes sounds on seeing flowers to communicate to the other bees who are at a distance. Do they produce this peculiar sound through their mouth or some other organ used for that purpose?

Majority of communication in human beings is through speech. Which organs give human beings the ability to talk?

Try this :

Imitate different sounds made by animals. Try to mimic your friends. While making these sounds, place your fingers on your throat. What do you feel? Do your fingers sense any vibrations? Are the vibrations same for all the sounds that you make?

Structrure of larynx or vioce box

Larynx is the important organ in human body to produce sound.

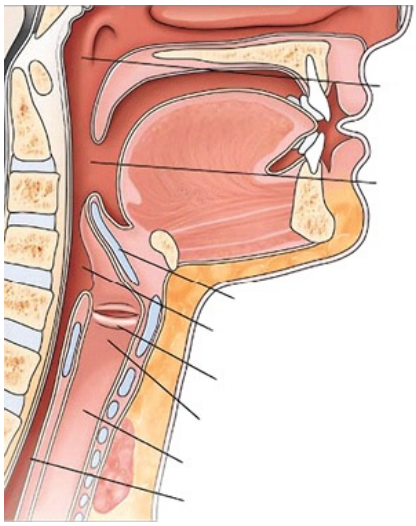


Fig-9: Anatomy of the larynx

Larynx has two muscular ligaments called vocal cords. They are stretched across voice box; it leads to a narrow slit between them, to allow passage of air, to produce sounds.

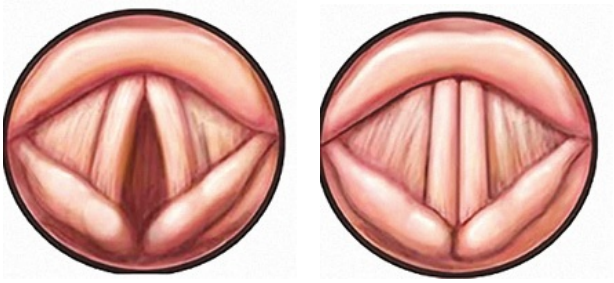


Fig- 10 (a) and 10 (b) : Opened vocal cords and Closed vocal cords

Obseve Fig- 10(a), Vocal cords slightly open during breathing to allow air into lungs. Observe Fig- 10(b), Vocal cords close when we speak. The air from the lungs presses between them to cause vibration and produce sound.

Do you know?

Length of vocal cords in men is nearly 20mm, in women it is about 5mm less, whereas in children it is shorter. Can we say that the length of vocal cords plays any role in deciding the quality of sound produced by men, women and children?

Activity-7

Observing the movements of vocal cords during speech

Ask a friend to raise his neck up. Stretch a chocolate wrapper across his mouth and ask him to blow air on the wrapper forcibly. Observe the changes in movement at his throat. Ask him to blow again slowly and observe the difference in movements.

- What changes do you observe in the movements at the throat on the two occasions?

During the first trial the voice box gets tensed and produces high sound while during the second trial it is close to normal position of throat and produces lower sound. The sound produced in the above activity is due to a combination of vibrations produced in the wrapper and the vocal cord.

If the sound is a kind of vibration, how does this vibration reach us from the source? How are we able to hear the sounds produced at a distance?

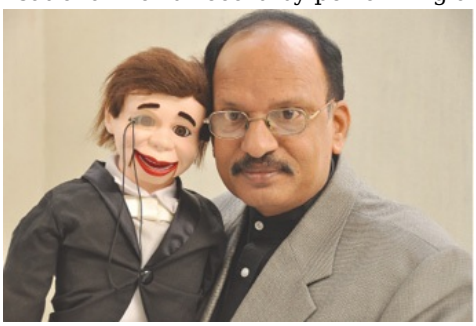
Propagation of sound

Sound needs a medium to propagate

The sound produced by the school bell will be heard by all of us irrespective of whether we are in a room opposite to the bell or in a room at the back of the bell. Obviously, the sound produced by the school bell travels in all directions and reaches us, propagating through the air present between source of the sound and our ears. That is the air surrounding us act as a medium which allows the sound to pass through it.

Do you know?

Can we talk without movement of lips? Ventriloquists make sounds or talk with hardly any movement of lips. Lips are slightly separated. The various words are spoken quickly and difficult for listeners to notice the difference. They have a very good control over breathing and movement of lips, throat and the muscles of mouth which aids in pronunciation and delivery of speech without much movement of lips and throat. They let the breath out of the mouth by vibrating their lips in accordance to the air supply and relax muscles while doing this. This is one of the most effective vocal activities. In Andhra Pradesh, Chinchapattana Gomatham Srinivas from Warangal district is a famous ventriloquist. He has performed more than 6000 shows around the world. He created a sensational world record by performing a 32 hour non-stop mimicry show in 1990.



Gomatham Srinivas

Nerella Venumadhav

Mimicry The mimicry artists maintain a very good control over their voices. The magic they create is solely with their voice. They exercise their vocal parts to keep them fit to be able to enthrall the audience through their voice. Dr.Nerella Venu Madhav is a world famous mimicry artist. He belongs to Warangal District of our State. Govt of India honoured him with a Padma Shree in 2001. Try these yourself and you can acquire a hobby.

- Does sound travel only in air?
- Does it travel in any other gaseous medium?
- Does sound also travel in other media like solids and liquids?

Propagation of sound in different media

Let us try to know how vibration can propagate through different media!

Activity-8

Observing sound propagation in solids

1. Strike one end of the table with a pen and ask your friend to listen to the sound produced keeping her ear touching the table at other end and also ask her to listen to the sound by lifting her head slightly from the table (fig-11). Ask your friend what difference she noticed while hearing the sounds when her ears were away from the table and touching the table.

Fig-11: Propagation of sound in solids

2. Take a metal or wooden strip. Strike it at one end and ask your friend to hear the sound by keeping his ears at the other end of the strip. Ask your friend what difference he noticed while hearing the sounds when his ears are away from the strip and touching the strip (fig-12).

Fig-12

Do you know how to make a toy telephone using tea cups?

3. Take two paper-cups. Make small holes at the bottom of these cups. The holes should be very small so that only a thin string can pass through them. Take a long string. Make sure that the string does not have any knots in it. Push the string through the hole in one of the cups. Fix the string by putting a knot at the end. Similarly fix the string to the other cup. Our phone is ready.

You and your friend can communicate with this phone now. Stand away from each other so that the string is tightly held. One of you can speak in the cup while the other can listen by putting the cup on his ear.

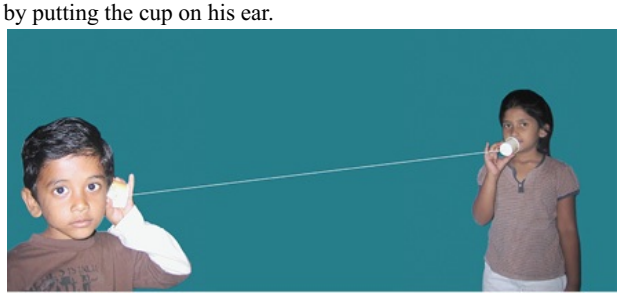


Fig-13

- Are you able to hear the sound?
- What is a medium between you and your friend which is responsible for propagation of sound?

In the above activities you observed that sound travels in solid medium like wood, metal, thread, etc.

- Does sound travel in liquids?
- Can we hear the sound produced in water?

Let us find out.

Acivity-9

Propagation of sound through liquids

Fig-14

Take a bucket fill it with water. Take two stones and strike them against each other keeping your hands inside the water. Ask your friend to listen to the sound by keeping his / her ears touching walls of the bucket. Ask your friend about the difference between sounds produced by striking the stones against each other in water and striking them in air.

Thus the conclusion is that sound propagates through matter in all the three states – solid, liquid and gas.

Think and Discuss

What is the effect of humidity on quality of sound propagation? Is there any difference in propagation of sound in air during the summer and winter seasons? Discuss with your friends.

Activity-10

Does sound travel if there is no medium?

Take a glass or plastic tumbler. Make sure that the tumbler is dry. It should be long enough to accommodate a cell phone vertically. Place a cell phone in the glass and play the ring tone of the mobile. Listen to the ringtone and it's volume level. Cover the glass with a small plate and again listen to the ringtone and note the difference in volume of the sound. Now suck the air from the glass keeping it close to your mouth as shown in the figure15. If you suck air quickly the rim of the glass will stick around your mouth due to air lock. Listen to the volume of the ringtone at this stage. And also ask your friend to listen to the sound for comparing variation in its volume. Is there any change in the volume of sound observed by you or your friend?

Fig-15: Sound does not travel (propagate) through vaccum

When the tumbler is covered with a plate, the volume reduces but you can hear the ringtone. As you start sucking more and more air, you can notice that the volume decreases gradually. If the air is sucked completely, you will not hear the sound at all. But practically it is not so easy. This activity gives an idea about the need of a medium for propagation of sound.

We can demonstrate that sound does not propagate through vacuum and it requires a medium, if we use perfect vacuum pumps to create vacuum which is not easy with the glass tumbler.

How do we hear sound?

We hear the sound produced in our surroundings with the help of our ears. The structure of ears play an important role in hearing the sound. Let us peep into our ear and try to understand how we hear sound.

Structure and functioning of the eardrum

Our ear consists of three sections, the outer ear, the middle ear and the inner ear as shown in the figure-16. Pinna of external ear collects the sound vibrations. They enter into the ear canal. We have learnt that sound travels in the form of vibrations. These vibrations strike the tympanum (ear-drum) and make it to vibrate.

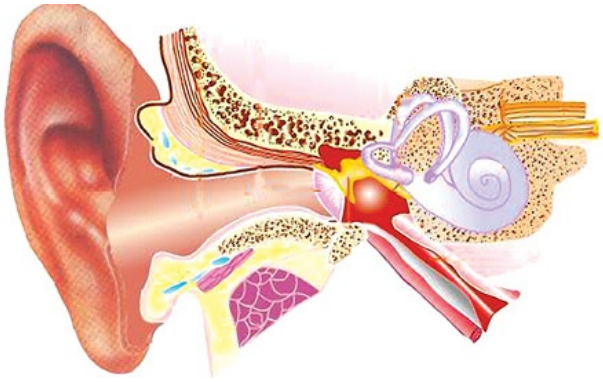


Fig-16: Structure of the ear drum

The vibrations from the tympanic membrane reach the middle ear (ear ossicles), contains three small bones malleus (hammer shaped), incus (anvil shaped) and stapes (stirrup shaped). They magnify the sound vibrations. The stapes transmits the vibrations to the membrane of oval window. The oval window has the surface area 1/20th of the ear-drum. By this the vibrations increase 30 to 60 times. The vibrations from the oval window transmit to the cochlea which is the inner part of the ear. The cochlea is filled with thick fluids which transmits the vibrations. The motion of the vibrations in the cochlea is detected by tiny hairs connected to nerves at this point. The vibrations are transformed into electrical signals and carried by the nerves to the brain where the sensation of the sound is realized. The sound vibrations can also reach the inner ear by travelling directly through the bones of the skull, as you tap your head.

Are there any harmful sounds that we hear? What happens when we hear such sounds?

Charecteristics of sound

We learnt how sound is produced and what a vibration is. Now, let us look at different characteristics of sound.

Loudness, feebleness and pitch

Sometimes people talk loudly and sometimes softly. If we hit a table hard we get a loud sound. If we tap the same table gently, we hear a feeble sound.

In our daily life we hear many loud sounds and feeble sounds on different occasions. For example, sounds emanating from drums during the prayer of assembly in the school are very loud. But the sound produced while we are taking pledge in the assembly is a feeble sound. We know that diwali is a festival of sounds and light. When we burst crackers we get many loud sounds.

- Why are some sounds loud?
- Why are some sounds feeble?
- Is there any relation between the intensity of sound and vibrations of the body which produces sound?

Think and Discuss

- "Vibrations produce sound and sound produces vibrations". Which is true in this? Discuss.
- "Our ear has the three media through which sound propagates." Discuss with your friends as to whether the above statement is true.

Lab Activity -1

Aim: To know the relation between the intensity of sound produced by a body and the vibrations of the body.

Material required: Wooden table, 30 cm metal scale or nearly 30 cm hack-saw blade and a brick.

Procedure :

1. Place the blade/scale on the table, with 10cm of the blade on the surface of the table and rest of it in air. Keep a heavy brick on one end of the 10 cm blade/scale kept on table (fig-17).
2. Vibrate the blade gently and observe the vibrations and simultaneously listen to the sounds. Repeat the same 2-3 times and record your observations in the table-4.

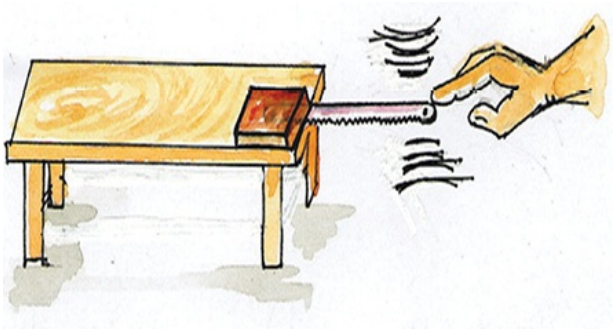


Fig-17:vibrations of the body and intensity of sound.

3. Vibrate the blade using greater force. Observe the vibrations and listen to the sound. Repeat this for 2-3 times and record your observations in the table-4.

Table 4

Force	Vibrations of the blade / scale	Intensity of Intensity of sound
Small		
Large		

- When do you hear a loud sound?
- When do you hear a feeble sound?
- What difference do you notice in vibrations of blade / scale during loud and feeble sounds?

The initial position of the scale at rest along the surface of the table, is called mean position.

As shown in the figure 18(scale) OA is the mean position of the vibrating body. OB and OC are the vibrations occurring in the body.

Fig-18

The to and fro motion of a body from its mean position is known as **one vibration.**

The body vibrates from the mean position OA to OC and comes back to OA and then moves from OA to OB and comes back. The maximum displacement of vibrating body from its mean position is called **amplitude.** In the picture given above the maximum displacement is A to B or A to C.

- What difference do you find in the amplitude of vibration for a feeble and a loud sound in the above experiment?

Do you Know?

Decibel is the unit for measuring the intensity of sound. It is denoted as dB.

The unit expressed as decibel in the name of Alexander Graham Bell (1847 – 1942), whose research in sound is famous.

The smallest audible sound (nearer to total silence) is 0 dB. A sound 10 times more powerful than this is 10 dB. A sound 100 times more powerful than that of total silence is 20 dB. A sound 1,000 times more powerful than the sound nearer to total silence is 30 dB. Some common sounds and their decibel ratings are given below.

- Near total silence - 0 dB
- A whisper - 15 dB
- Normal conversation - 60 dB
- A lawnmower - 90 dB
- A car horn - 110 dB
- A jet engine - 120 dB
- A gunshot or firecracker - 140 dB

Problems: From the above data, compute the following.

How many times is a car horn more powerful than normal conversation?

How many times is a jet engine more powerful than a whispering sound?

Lab Activity-2

Aim: Identifying pitch or shrillness of a sound.

Material required: A wooden table, two hack-saw blades or metal scales of 30cm length and a brick.

Procedure:

1. Place the first blade/scale on the table, with 10cm portion of the blade on the table and rest of it in air. Keep a brick as weight on the 10 cm portion of the blade/scale kept on the table.
2. Place the second blade/scale on the table (see that the gap between these two blades is 10cms), with 25cm on the table and 5cm in air. Keep a brick as weight on the scale/blade (fig-19).
3. Vibrate both blades with same force. Observe the vibrations and listen to the sounds produced.

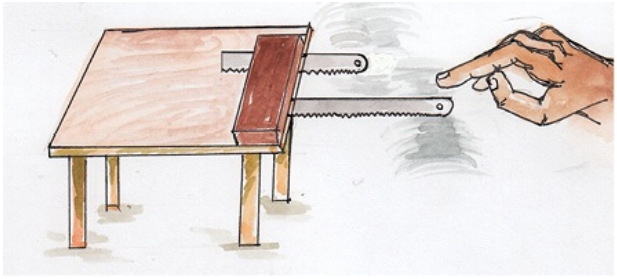


Fig-19: Vibrations of hack - saw blades

Repeat the same 2-3 times and record observations in the table-5.

Table 5

Blade length in Air	Vibrations	Sound
Blade 1 : 20cm		
Blade 2 : 5cm		

- What difference do you notice in number of vibrations of two blades?
- What difference do you notice in the quality of sound produced by them?

You would notice that the number of vibrations produced are less in the 20cm long blade when compared to the vibrations of the 5cm long blade. The sound produced by the 5cm blade is more shrill when compared to that of the 20cm blade.

The shrillness of a sound is known as **pitch.**

The number of vibrations per second (vib/sec) is called **frequency**.

The pitch of the sound depends upon its frequency.

In the above experiment number of vibrations per second in 20cm blade is less. It denotes that it has low frequency. Whereas the number of vibrations per second are more in 5cm blade so it has high frequency.

Thus the sound produced by a short blade (5cm) has high pitch and sound produced by long blade (20cm) has low pitch.

Conduct the above experiment with different lengths of the blades or metal scales and note your observations.

A bird makes high pitch sound and a lion makes low pitch roar. Which one produces the sound of more frequency?

Give some more examples of natural sounds that you come across in your daily life and differentiate them as low pitch sounds and high pitch sounds.

Do you know?

Pitch of the voices of the following is in ascending order.

Lion<adult man<adult women<child <infant<insect

- Can you guess the reason why?
- Do you find any difference in blowing the whistle and striking the drum?

Normal sound consists of mixed frequencies

In our daily activities, we hear many different sounds. But we generaly do not concentrate on every sound that we hear. All these different sounds are produced with different frequencies and with different amplitudes. For example, the different sounds produced in a classroom before the commencement of the class. If we keenly observe these sounds, we can find that no two persons produce the same sound of equal pitch and amplitude.

- Why do we produce sounds with different pitches or amplitudes while speaking?

The variation in pitch and amplitude of sound during our speech helps us to communicate with others in the form of language.

Primitive man had no developed language, but he used to communicate with signs and some sounds which had no written equivalent. Later in the process of evolution these sounds became a source of a meaningful communication and eventually were converted into written forms. This led to the development of the full form of language which we all use now to communicate. Not only human beings but animals too have a mechanism of communication by producing sounds with different frequencies and amplitudes according to their need.

The parts of the speech organ which are involved in producing sounds are

- Vocal cords
- Lips
- Teeth & tongue
- Nose & throat

Naturally, the words that we utter do not have a single sound but are a combination of sounds with different frequencies and amplitudes. The sound produced for each letter possess a particular frequency. Thus, the word is a combination of different letters of different frequencies i.e., a word is sound of mixed frequencies. Sometimes the same word is uttered in different ways to express different emotions. For example, the word **'NO'** is uttered in different pitches to express **negativity, anger and frustration.**

Noise and music

- How do you feel when you hear sounds in busy traffic?
- How do you feel while listening to songs from a radio?
- Which of the above sounds are more pleasant to hear?

We enjoy the sounds in a music concert. They are pleasant to hear. But there are some sounds which are unbearable to hear like the sounds produced when a steel plate or utensil is dropped on the floor.

The sounds which are pleasant to hear are called music. The sounds which are not pleasant to hear are called **noise**. Noise is an irregular combination of sounds which are 'unpleasant' to hear. **Music** is a combination of sounds that are produced in an order and pleasant to hear.

Give some more examples for pleasant and unpleasant sounds.

Audible range

One of our sense organs, ear, enable us to hear a number of sounds. Are we able to hear all sounds produced in our surroundings?

- Do we hear the sounds produced by bats?

The sounds that a normal human being can hear are called audible sounds. The sounds that a normal human being cannot hear are called inaudible sounds. Frequency of the audible sound ranges from 20vibrations/sec-20000vibrations/second. Frequency of inaudible sounds are less than 20vibrations/sec or greater than 20000vibrations/sec.

Sound pollution

Sound pollution is a serious problem like air, water pollution. It is harmful to human beings. We express the loudness of the sound in decibels (dB), which we have already learnt in this chapter. The sound produced in our normal conversation is about 60dB. If the loudness exceeds 80dB, the sound becomes physically painful. If a person is being exposed to the sound of 80dB continuously it may lead to hearing problems.

Let us observe the sounds that are responsible for sound pollution.

In our surroundings there are many sounds causing sound pollution, like sounds of traffic, their horns, sounds in construction sites, sounds at industries, sounds at mines, sounds during explosions and bursting of crackers, etc.

The unwanted sound in our surroundings leads to sound pollution. There are some more sources of sound pollution in our homes like mixer/ grinder, washing machines and motors etc.

Write some more sources of sound pollution in your surrounding.

Effects of sound pollution

What are the harmful effects of sound pollution?

The first harmful effect is loss of hearing. It also leads to several health related problems. eg: sleeplessness, hyper tension, increase in blood pressure, etc…,

Discuss and list some more effects of sound pollution.

Measures to control sound pollution

We cannot stop production of sound but we can reduce sound pollution by some measures.

Let us list the steps which can be taken to reduce sound pollution:

- Attach silencers to bikes and other machines to reduce sounds.
- Manufacture machines that work with less noise
- During the use of TVs and music players tone down volume of sound.
- Plant trees to reduce sound pollution.

Discuss with your friends about some other measures to limit sound pollution and tabulate them.

Do you know?

M.S. Subbulakshmi was famous for her melodious music. It would be difficult to overstate the talent and the impact made by Smt. M.S. Subbulakshmi, not just in the field of Karnatic music, but also as a philanthropist and a person who

Manufacture machines that work with less noise During the use of TVs and tape recorders tone down volume of sound. Plant trees to reduce sound pollution. Discuss with your friends about some other measures to limit sound pollution and tabulate them.

placed her life at the service to the country and people. She rendered her voice to devotional songs. Ghantasala Venkateswar Rao was famous playback singer. He was famous for his melodious voice. He sang more than 10,000 songs in Telugu, Tamil, Kannada, and Malyalam and worked as a music director for over 100 films. His private songs were equally popular and his devotional songs are popular even today.

Key words

Vibration, vocal cords, medium, vacuum, ear drum, loudness, feeble, amplitude, decibel, pitch (shrillness), frequency, noise, music.

What we have learnt?

- Vibrating body produces sound.
- Human beings are able to produce sound with the help of vocal cords.
- Sounds travel through solids, liquids, and gases. It cannot travel through vacuum.
- The vibration of the ear drum caused by the sound produced by a vibrating body gives us sense of hearing.
- Loudness and feebleness of a sound are determined by amplitude of vibration.
- The intensity of sound is measured in dB (decibels)
- Pitch or shrillness is determined by the frequency.
- The number of vibrations per second is called frequency.
- Normal sounds consist of mixed frequencies.
- The hearing limit of sounds by human beings is called audible range.
- Sounds pleasant to listen are called music and unpleasant to listen are called noise.

Improve your learning

1. Fill in the blanks with suitable words. (AS_1)

a) The to and fro motion of a body from it's mean position is called ……..

b) Number of vibrations per second is called ……..

c) The intensity of sound can be measured in …….

d) Sound cannot travel in …….

e) Vibrating bodies produce ……

f) The maximum displacement of a body from its mean position is called ……..

2. A normal humanbeing can listen to sounds with frequency from _____ to_____ vibrations per sec. (AS_1)
3. How will you differentiate the amplitude and frequency of different sounds? Give two suitable examples from your daily life. (AS_1)
4. Write any three musical instruments that you know and explain how they produce sound. (AS_1)
5. The sounds of crickets (insects) make us close our ears. Why? (AS_1)
6. Robert observed a musical instrument producing sound. But he didn't find any vibration of any part of that instrument. This observation raised many questions in his mind. Can you guess what are the questions raised in his mind? Write them. (AS_2)
7. "Vibrations in a body produce sounds". How do you prove it? (AS_3)
8. Can parrots speak? Discuss with your friends and collect information. (AS_4)
9. Collect the photographs of local musicians and exhibit them in your class. (AS_4)
10. Collect photographs showing various situations of sound pollution and prepare a scrap book. (AS_4)
11. Zakir said "vibrations produce sound. And sound produces vibrations. This is how we hear every sound". Establish that the given statement is true with relevant examples from your surroundings. (AS_4)
12. Make different musical instruments using local available materials and exhibit them in your class. (AS_5)
13. Explain why we are not able to hear the explosions taking place in the sun. (AS_7)
14. Write any two slogans to reduce sound pollution.
15. Write your suggestions about reducing sound pollution. (AS_7)
16. How does sound pollution effect Bio diversity? Explain. (AS_7)

Do you know?

Golconda Fort - Hyderabad - Telangana State

It is a famous fort in India. It is famous for many engineering and architectural marvels. If you clap your hands at a particular point under the dome it reverberates and can be heard at the highest point of the fort which is about 1km away.