Introduction

- There are variety of sound that we hear in our surrounding like sound of doorbell, sound of foot step, chirping of birds, sound of musical instrument like flute, guitar, table etc.
- Sound helps us to listen and communicate with one another.

Sound is produced by a vibrating body

➢ Activity 1

1. Stretch a rubber band by putting it around a box say a pencil box.
2. Insert two pencils between the stretched rubber and box.
3. Now, from somewhere in the middle pluck the rubber band.
4. You will hear a sound and will find that the rubber band vibrates while producing that sound.

- Vibration is to and fro motion of an object.
- When the amplitude is high, we can easily see the vibrations but when the amplitude is so small, we cannot see the vibration.
- All musical instruments vibrate while producing sound.
- Different musical instruments have different vibrating part.

Types of musical instrument	Vibrating part producing sound
• Flute	Air column
• Piano	Stretched string
• Table	Stretched membrane
• shehnai	Air column

- human body has vocal cords which vibrates when we speak.

Sound produced by humans

- In human larynx or the voice box is the producer of sound.
- A hard bump in the throat is the voice box which is at the upper end of the windpipe.
- Across the larynx, two vocal cords are stretched in such a way that it leaves a narrow slit between larynx and vocal cords for the air to pass through.
- The vocal cords vibrates when the lungs force air through the slit.
- Type or quality of the voice depends on whether the vocal cords are tight and thin or loose and thick.
- Vocal cords are attached to the muscles which make them tight or loose.
- Men, women and children have different voices because of the size of the vocal cords.
- In men vocal cords are about 20mm long women have about 5mm shorter vocal cords than women. Children have very shorter vocal cords.

Sound needs a medium for propagation

- To travel from one point to another sound needs a medium whether it is solid, liquid or gas.
- If there is no medium or in vacuum sound cannot propagate.

➢ **Activity 2**

1. Place a cell phone in a dry glass tumbler.
2. Ask your friend to give a call on this phone.
3. Now put your mouth on the opening of the glass tumbler while covering the rim of the glass by your hand.
4. Now carefully listen to ring while sucking the air inside the glass tumbler.
5. You will find that the sound of ring is getting lower as the air inside the glass is getting less.

We hear sound through our ears

- Sound enters through the upper part of the ear which is like a funnel.
- Then sound reach to the eardrum via a canal.
- Eardrum is a tightly stretched membrane which vibrates when sound vibrations reach to it.
- These vibrations then send to the inner ear by the eardrum.
- And then from the inner ear the signal goes to brain.
  [Note: Eardrum is a thin sheet like membrane. It is so delicate and important that a damaged eardrum can impair hearing so we must not put any sharp or pointed thing into the ear.]

Amplitude, time period and frequency of a vibration

- The to and fro motions which we also called vibrations are called oscillatory motions and the time taken to complete one oscillation is called its time period.
- The number of times an object vibrates per second is called the frequency of the vibrations or we can say that the number of oscillations in one second is called the frequency of the oscillations.
  For example: if an object oscillates 20 times in one second then its frequency will be 20Hz.
- Hertz is the unit of frequency and its symbol is Hz.
- The two important properties of any sound are its frequency and amplitude.
- Amplitude decides the loudness of sound. A loud sound is produced when the amplitude is high. A low sound is produced when the amplitude is small.
- Pitch or shrillness is determined by the frequency of sound. If an object vibrates with a low frequency, then it will produce a low-pitched sound. If an object vibrates with a high frequency, then it will produce a high-pitched sound.

For example: a drum produces a low-pitched sound because it vibrates with low frequency. A whistle produces a high-pitched sound because it vibrates with high frequency.

Audible and Inaudible sounds

- An audible sound is the sound that we can hear. And the sound that a human ear cannot detect is called inaudible sound.
- A human ear cannot detect a sound less than 20Hz and more than 20,000Hz.
- The audible range of sound that a human can hear is from 20Hz to 20,000Hz.
- Animals can hear sounds of frequencies more than 20,000Hz.
- The ultrasound equipment can detect higher frequencies sound and used for investigating many medical problems.

Noise and music

- The unpleasant sound such as sound at construction site, sound of horns of buses and cars or sound produces in a market area is called noise.
- The sound which soothes our mind and pleasant to the ear such sound produced by a musical instrument or chirping of birds are called music.

Noise pollution

- The excessive or unwanted sound present in our surrounding is called noise pollution.
- Some of the major causes of the noise pollution are sounds of crackers, machines, loudspeakers, vehicles etc.
- Some of the home appliances also contribute to the noise pollution such as sound of mixer grinder, loud sound of televisions and radios, air conditioners.

What are the harms of noise pollution?

- Noise pollution may cause many health-related problem like hypertension, lack of sleep, anxiety and many more.
- Ear can be damaged temporarily or permanent if a person is exposed to a loud sound.

Measures to limit noise pollutions

- Controlled use of sources of sound can be very effective in controlling the noise pollution.
- We should take public transport, silencers should be installed in aircrafts, loud speakers should be avoided.