

Chapter 13: Sound

Sound is important as it helps us to communicate with one another. A variety of sounds are generated in the surroundings.

- Sound is Produced by a Vibrating Body:
 1. Vibration: The back-and-forth motion of an object is called vibration.
 2. Example: Sound is produced when a string or band is plucked.
 3. The sounds are produced due to these vibrational energies.
 4. As the amplitude of the sound waves is quite small, the vibrations are not visible. But it can be felt.

- Sound Produced by Humans:
 1. The larynx or the sound box produces voice.
 2. It is a hard bump like structure on the throat which appears to move when one swallow and is at the upper end of the windpipe.
 3. This part is known as the voice box.
 4. The larynx has two vocal cords stretched across it, in such a way that it leaves a narrow slit between them for the passage of air.
 5. When the lungs force air through the slit, the vocal cords vibrate, producing sound.
 6. Muscles attached to the vocal cords can make them tight or loose which produce different qualities of voice.

- Sound Needs a Medium for Propagation
 1. Sounds need a medium to travel.
 2. Sound cannot travel through a vacuum for their propagation.
 3. The medium can be solid. For example, wood, metals etc.
 4. Vibrating objects can produce sound and it is carried in all directions in a medium.
 5. The medium could either be a gas, a liquid or a solid.

- Ears:
 - ✓ The ear has two parts:
 - 1. Outer or external ear:
 - It has a funnel shape. Sound travels down the canal and enters the eardrum
 - Eardrum: A thin stretched membrane at the end of the outer ear
 - The eardrum is like a stretched rubber sheet. Sound vibrations make the eardrum vibrate.
 - 2. Inner or internal ear:
 - The eardrum sends vibrations to the inner ear.
 - From the inner year, the signal goes to the brain and we hear things.

- Amplitude, Time Period and Frequency of a Vibration
 1. Oscillatory motion: The to and fro motion of an object is called oscillatory motion

2. Frequency: The number of oscillations per second is called the frequency of oscillation. Unit of Frequency is hertz. Its symbol is Hz. A frequency of 1 Hz is one oscillation per second.
3. Amplitude and frequency are two important properties of any sound.

➤ Loudness and Pitch

1. Loudness:

- Loudness of sound is proportional to the square of the amplitude of the vibration producing the sound.
- The loudness is expressed in a unit called decibel (dB).
- The sound above 80 dB becomes physically painful.
- The loudness of sound depends on its amplitude.
- When the amplitude of vibration is large, the sound produced is loud.
- When the amplitude is small, the sound produced is feeble.

2. Pitch:

- The frequency determines the shrillness or pitch of a sound.
- If the frequency of vibration is higher than the sound is shrill and has a higher pitch.
- If the frequency of vibration is lower, we say that the sound has a lower pitch.

➤ Audible and Inaudible Sounds:

- 1.) Inaudible sound: It is the sounds of frequencies less than about 20 vibrations per second (20 Hz) cannot be detected by the human ear. Also sounds of frequencies higher than about 20,000 vibrations per second (20 kHz) are also not audible to the human ear.
- 2.) Audible sounds: the sounds audible to human ear should have frequencies roughly from 20 to 20,000 Hz

➤ Noise and Music

- Noise: Unpleasant sounds to the ear are called noise
- Music: pleasing sounds from musical instruments are called music

➤ Noise Pollution:

- Air pollution: The presence of unwanted gases and particles in air is called air pollution.
- Noise pollution: Presence of excessive or unwanted sounds in the environment is called noise pollution.
- Major causes of noise pollution are sounds of vehicles, explosions including bursting of crackers, machines, loudspeakers etc.
- The presence of excessive noise in the surroundings may cause many health-related problems like Lack of sleep, hypertension (high blood pressure), anxiety and many more health disorders may be caused by noise pollution.
- A person who is exposed to a loud sound continuously may get temporary or even permanent impairment of hearing.

➤ Measures to Limit Noise Pollution:

- Silencing devices must be installed in air craft engines, transport vehicles, industrial machines and home appliances.
 - All noisy operations must be conducted away from any residential area.
 - Noise producing industries should be set up away from such areas.
 - Use of automobile horns should be minimized.
 - TV and music systems should be run at low volumes.
 - Trees must be planted along the roads and around buildings to cut down on the sounds reaching the residents, thus reducing the harmful effects of noise pollution.
- Hearing Impairment
- Total hearing impairment, which is rare, is usually from birth itself.
 - Partial disability is generally the result of a disease, injury or age.
 - Technological devices for the hearing-impaired have made it possible for such persons to improve their quality of life.