

SUMMARY

Production and Propagation of sound

Sound is a form of energy that causes the **sensation of hearing**. Sound needs a **medium** to travel. Sound travels through gases, liquids and solids. The speed of sound is the maximum in solids, less in liquids and the least in gases. Sound cannot travel through **vacuum**. In humans, sound is produced by the **voice box** or the Larynx. Vocal cords in the larynx vibrate and produce sound. We hear sound with our ears. The **ear drum** has a vibrating membrane like a stretched rubber sheet. When a sound note reaches the ear, the ear drum vibrates, and the **vibrations** get converted into signals that are carried to the brain to get a sensation of hearing.

To produce **pleasant sounds**, a number of **musical instruments** have been developed. Some instruments produce sound due to the **vibration of membranes**, some due to the **vibration of strings**, and some others produce sound due to the **vibration of an air column**. The **to and fro** or back and forth motion of an object is called **vibration**. The sitar, veena, violin, guitar and ektara are some **stringed instruments**. The tabla, cymbals, ghatam, kartal and manjira are some instruments that work on the **vibration of a membrane**, and instruments like the flute and the trumpet produce sound due to the **vibration of an air column** present in them.

Characteristics of sound

Sound is a form of energy produced by a **vibrating** body. Sound requires a medium for its propagation. Sound does not propagate in vacuum. Sound is produced due to the **vibration** of an object.

The **to and fro** or back and forth motion of an object is called **vibration**. To produce **pleasant sounds**, a number of **musical instruments** have been developed. Some instruments produce sound due to the **vibration of membranes**, some due to the **vibration of strings**, and some others produce sound due to the **vibration of an air column**. The maximum displacement of a vibrating particle from its mean or equilibrium position is called its **amplitude**. The time taken by the vibrating particle for one full vibration or oscillation is called the **time period** of vibration. The number of vibrations per second is called the **frequency**. Frequency is measured **hertz (Hz)**.

Sound produced by any means has the following characteristics, namely, **loudness**, **pitch** or **shrillness**, and **quality** or **timbre**.

The **loudness** of sound depends on its **amplitude**. The loudness of sound is proportional to the square of the amplitude. A roar of a lion is louder than a woman's voice. The **pitch** of sound depends on its **frequency**. If frequency is more, then the pitch or shrillness is more. The **pitch** of a woman's voice is more and it is **shriller** than a man's voice. The loudness of sound is measured in **Decibel (db)**. If loudness exceeds 80 db, then the sound becomes physically painful.

Not all sound produced by vibrating bodies is audible. The human ear can only recognise sounds of frequencies in the range of **20 Hz and 20,000 Hz**. This range of frequency is called **audible sound**. Some animals like dogs and snakes can hear sounds of frequencies greater than 20,000 Hz.

Sounds of frequencies less than 20 Hz are called infrasonic sounds, while sounds of frequencies greater than 20,000 Hz are called ultrasonic sounds.

Noise and Music

Any **intolerable** and irritating sound is called **noise**. The word noise comes from the Latin word nausea, meaning **seasickness**.

Music refers to any sound that is **pleasant** to the ear. Sound produced by **musical instruments** is pleasing to the ear. But if the **intensity of the** sound exceeds a certain limit, then it becomes intolerable and is noise.

Undesirable sounds and disturbances cause **noise pollution**.

Noise pollution may cause high **blood pressure**, **panic attacks** and **lack of sleep** among those exposed to it. To reduce noise pollution, trees should be planted along roads and in residential areas, factories should not be set up in residential areas, vehicles should not blow horns around schools, hospitals and residential area, TVs and music systems should not be played at high volume.

Continuous exposure to **loud noise** may cause temporary or even permanent **hearing impairment**.

Sign language is used by the hearing disabled to communicate.