STEPPING STONE SCHOOL(HIGH)

Class : 10

Sub : Physics

Chapter : Sound

Date : 1.07.2020

Day :14

Worksheet :14

Topic : Reflection of sound waves and echoes (Part 1)

Please read the chapter from your text book and the attached notes. Then work out the exercises neatly with black ink in your note book henceforth. Ensure neat and tidy work.

Sound waves:

Sound is produced when a body vibrates and it reaches through the vibration of the particles of the surrounding medium. Thus sound requires a medium for its propagation.

Our ears are sensitive only to a limited range of frequencies from 20 Hz to 20,000Hz which is called the audible range of frequency.

The sound of frequency above 20,000Hz is called ultrasonic while the sound of frequency below 20 Hz is called infrasonic.

Both ultrasonic and infrasonic are inaudible to human beings, but they both travel in a medium with the speed same as that of audible sound.

Relation between velocity of sound, frequency and wave length.

When a sound wave travels in a medium, the maximum displacement of the particle of the medium on either side of its mean position, is called the amplitude of the wave.

The number of vibrations made by the particle of the medium in one second, is called the frequency of the wave.

The distance traveled by a wave in one time period of vibration of the particle of the medium is called the wave length.

The distance traveled by the wave in one second is called the wave velocity.

Relation:

Wave velocity = frequency X wave length

Mechanical waves

When the medium particles vibrate, there is a change of kinetic energy into potential energy and vice versa, so sound waves are also called elastic or mechanical waves.

Mechanical waves are of two kinds:

i) Longitudinal waves
ii) Transverse waves

- If the vibrations of medium particles are along the direction of propagation of the wave forming compressions and rare functions in the medium, the wave is longitudinal wave.

- If the medium particles vibrate normal to the direction of propagation of the wave, forming crests and troughs, the wave is called transverse wave.
- Sound waves are longitudinal waves

The speed V of a longitudinal wave in a gaseous medium of 'd' at a pressure p is given as

$$V = \sqrt{\frac{\gamma P}{d}}$$

where γ is 1.4 for air.

The speed V of a transverse wave in a stretched string depends on the tension T and mass per unit length m of the string

$$V = \sqrt{T/m}$$

Reflection of sound waves:

The return of a sound wave on striking a surface such as wall, metal sheet etc. back in the same medium is called the reflection of sound.

Exercise

1) What are mechanical waves?
2) Define the following terms:
   a) Wave length
   b) Frequency
   c) Amplitude
   d) Wave velocity

3) A wave passes from one medium to another medium. Mention one property of the wave, out of speed, frequency or wave length
   i) Which changes
   ii) Which doesn’t change
4) State two factors on which the speed of a wave travelling in a medium depends.
5) State two differences between light and sound waves.
6) What do you mean by reflection. State one condition for the reflection of a sound wave. Name a device in which reflection of sound waves is used.

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