

Answers of chapter 6 (Sound)

Class - VII

Physics

- 1) The to and fro motion in which the body assumes a new shape during its motion is called the vibratory motion.
- 2) Sound is a form of energy that produces the sensation of hearing in our ears.
- 3) Sound is produced when a body vibrates. In other words, each source of sound is a vibrating body.
- 4) Experiment - Activity 1 or activity 2 (pg-91)
- 5) Two sources of sound are tuning fork and guitar.
- 6) Our throat has a larynx (or voice box) which is designed to produce sound. Inside the two folds of the tissue in it there are vocal cords. When we talk, shout or sing, the cords become tight and hence they vibrate, thus producing sound.
- 7) Bees do not have voice boxes. They produce sound by moving their wings up and down very fast.

8) Sound cannot travel through a vacuum as it needs a medium for its propagation.
Experiment - Pg-94 (along with diagram Pg-6,12)

9) Experiment - Activity - 9 (Pg-95)

10) Experiment - Activity no. - 7 (Pg-94)

11) No, two person cannot hear each other on moon's surface. Sound requires a medium for its propagation. As there is no atmosphere on moon, sound cannot be heard.

12) In a longitudinal wave, the particles of air vibrate to and fro about their mean positions in the direction of travel of sound.

13) Define :-

i) Amplitude :- The maximum displacement of a wave on either side of its mean position is known as the amplitude.

ii) Time period :- The time taken by a wave to complete one vibration is known as its time period. It is measured in second.

iii) Frequency :- The number of vibrations produced by the source of sound in one second is known as its frequency.

- 14.) The audible range of frequency for the normal human ear is 20 hertz to 20,000 hertz.
- 15.) Sounds of frequency higher than 20,000 Hz are called the ultrasonics. We cannot hear the ultrasonic sounds.
- 16.) Sounds of frequency lower than 20 Hz are called the infrasonics. We cannot hear the infrasonic sounds.
- 17.) Bats produce ultrasonic sound as they fly. When this ultrasonic sound comes back after reflection from any object (or obstacle) in their way, they hear it and thus they detect the presence of the object (or obstacle). Thus, even though they don't have eyes, bats easily move about without colliding with any object.
- 18.) The two characteristics of sound which differentiate the sounds from each other are
i) loudness and ii) pitch.
- 19.) The loudness of a sound depends on
i) the amplitude of vibration of the vibrating body.
ii) the area of the vibrating body.

20) Loudness of sound produced depends on the vibrating area of the body in the following way - greater the area of the vibrating body, louder is the sound produced.

21) We know that greater the area of the vibrating body, louder is the sound produced. So the outer case of the bell in a temple is made big such that more louder sound can be produced.

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Class: 7 SOUND

Question 22.

State the factors on which the pitch of a sound depends.

Answer:

The pitch of a sound depends on its frequency (i.e., on the frequency of the vibrating body).

Question 23.

Differentiate between a high pitch sound and a low pitch sound.

Answer:

Higher the pitch, the shriller is the sound. Lower the pitch, the flat (or grave) is the sound.

Question 24.

How does a man's voice differ from a woman's voice ?

Answer:

A female voice is shriller than a male voice because of higher frequency. Higher is the frequency, shriller is the sound. Female has higher frequency.

Question 25.

Name the characteristic which differentiates two sounds of the same pitch and same loudness.

Answer:

The quality is the characteristic of sound which distinguishes the two sounds of the same pitch and same loudness.

Question 26.

You recognize your friend by hearing his voice on a telephone. Explain.

Answer:

We can recognize our friend by hearing his voice on a telephone due to quality of sound and pitch of sound.

Question 27.

A musician recognizes the musical instrument by hearing the sound produced by it, even without seeing

the instrument. Which characteristic of sound makes this possible ?

Answer:

It is the pitch and quality that helps a musician recognize the musical instrument by hearing the sound produced by it, even without seeing the instrument.

Question 28.

Describe an experiment to show the production of sound having low and high pitch.

Answer:

Take few rubber bands some thicker and longer, few thinner and of shorter length. Cut and stretch these rubber bands by holding one end of the string in your mouth under the teeth and the other end in your hand. Now pluck these rubber bands one by one. The rubber bands thicker and longer will produce sound with a lower pitch. The rubber bands thinner and shorter will produce sound with a higher pitch.

Question 29.

How does a musician playing on a flute change the pitch of sound produced by it?

Answer:

In musical instruments like flute and clarinet, the pitch of sound is changed by changing the length of vibrating air column when different holes in it are closed. Decreasing the length of vibrating air column the pitch of sound increases and vice-versa.

Question 30.

Why are musical instruments provided with more than one string ?

Answer:

The stringed instruments are provided with a number of strings of different thickness and under different tensions so that each string produces sound of a different pitch.

Question 31.

How can the pitch of sound produced in a piano be changed?

Answer:

In a piano, the string is struck to make the string vibrate and produce sound. The pitch of sound produced can be changed by stretching or loosening the strings of piano.

Question 32.

Explain why you can predict the arrival of a train by placing your ear on the rails without seeing it.

Answer:

The sound produced by the moving wheels of train travels much faster through the track than through the air. Therefore they hear through the track much before it is heard through the – air.

Question 33.

Write the approximate speed of sound in (i) air, (ii) water and (iii) steel.

Answer:	Medium	Speed of sound
(i)	Gas Air	330 m s ⁻¹
(ii)	Liquid Water	1500 m s ⁻¹
(iii)	Solid Iron or Steel	5000 m s ⁻¹

Question 34.

During a thunderstorm, the sound of a thunder is heard after the lightning is seen. Why ?

Answer:

The velocity of light is 3×10^8 m/s whereas velocity of sound is 332 m/s. First we see the flash of light and then we hear the thunder.

Question 35.

Describe an experiment to estimate the speed of sound in air.

Answer:

To estimate the speed of sound in air suppose we choose two hills A and B about a kilometer apart. A person at the hill A fires a gun. Another person at the hill B starts a stop watch as he sees the flash of the fire and stops it on hearing the sound. Thus, he measures the time interval between the seeing of flash and hearing of the sound. Let it be t second. Then measure the distance between the hills A and B. Let it be S metre.

$$\text{The speed of sound } V = \frac{\text{Distance (S)}}{\text{Time (t)}}$$

$$= \frac{S}{t} \text{ ms}^{-1}$$

Experimentally, it is found that the speed of sound in air is nearly 330 m s⁻¹

Question 36.

Can sound travel through solids and liquids ? In which of these two does it travel faster ?

Answer:

Sound travels with highest speed in — solids.
and Sound travels with lowest speed in — gases.

Question 37.

What do you mean by reflection of sound ?

Answer:

Reflection of Sound— When a sound wave strikes a rigid surface, it retraces from its path is called reflection of sound.

Question 38.

State one use of reflection of sound.

Answer:

The reflection of sound is used in making the speaking tube (or megaphone), sound board and trumpet.

Question 39.

What is echo ?

Answer:

Echo is the sound heard after reflection from a rigid surface such as a cliff, a hillside, the wall of a building etc.

Question 40.

What minimum distance is required between the source of sound and the reflecting surface to hear an echo ? Give reason.

Answer:

Since sound has to travel an equal distance in going up to the reflecting surface and in coming back from the reflecting surface, therefore it must travel nearly $33/2 = 16.5$ m

either way. Thus, to hear the echo clearly in air, the reflecting surface should be at a minimum distance of 16.5 m from the source of sound.

Question 41.

List four substances which are good absorbers of sound.

Answer:

When sound falls on sofa, fluffs and light substances such as clothes, papers, thermocol, coating of plaster of paris, carpets, curtains, furniture, wood etc., they absorb the sound to a good extent. These are called good absorbers of sound.

Question 42.

List the measures that you will take when designing a sound-proof room.

Answer:

In order to design such a sound proof room we take the following measures

- (1) The roof of the enclosure must be covered by plaster of paris after putting the sheets of thermocol.
- (2) The walls of the enclosure should be covered by the wooden strips.
- (3) The floor must be laid down by thick carpets.
- (4) The machine parts of all the electrical equipments such as fan, air conditioner etc. must be placed outside the enclosure.
- (5) Thick curtains should be used to cover the doors and keep them closed.
- (6) Thick stripping must be used to cover the openings of doors and windows.

Numerical 1.

A boy fires a gun and another boy at a distance of 1020 m hears the sound of firing the gun 3 s after seeing its smoke. Find the speed of sound.

Answer:

$$\text{Speed} = \frac{\text{Distance travelled}}{\text{time taken}}$$

$$\text{Speed} = \frac{1020}{3} = 340 \text{ m s}^{-1}$$

Numerical 2.

A boy on a hill A fires a gun. The other boy on hill B hears the sound after 4 s If the speed of sound is 330 m s^{-1} , find the distance between the two hills.

Answer:

$$\text{Speed, } v = 330 \text{ m s}^{-1}$$

$$t = 4 \text{ s}$$

$$\text{Distances} = v \times t$$

$$= 330 \times 4 \text{ s} = 1320 \text{ m Ans.}$$