CBSE Test Paper 05

Chapter 12 Sound

1. Which of the following are transferred from one place to another place by the waves? **(1)**
   a. sound
   b. velocity
   c. wavelength
   d. mass
2. For echo to take place for simple sounds, the distance between the source of sound and the reflecting surface should be **(1)**
   a. 17 cm
   b. 17 m
   c. 34 m
   d. 1.7 m
3. An echo is heard when-
   (A) Minimum distance is 17.2 m
   (B) Minimum time gap between two sounds is $\frac{1}{10^{th}}$ of second
   (C) Minimum distance is 18 m
   (D) Minimum time gap between two sounds is $\frac{1}{100^{th}}$ of second
   a. (B) and (C) are correct
   b. (A), (B) and (C) are correct
   c. (A) and (B) are correct
   d. All of these
4. A sound wave travels at a speed of 344 ms^{-1}. If its wavelength is 0.02m, what is the frequency of wave? **(1)**
   a. 17200 Hz
   b. none of these.
   c. 1700Hz
   d. 17820Hz
5. The instruments Megaphone, Stethoscope, Hearing acids and Sound boards work based on the principle of **(1)**

a. reflection
b. absorption
c. persistence
d. reverberation

6. Children can hear sound of frequency up to (1)
   a. 25,000 Hz
   b. 20Hz
   c. 30,000Hz
   d. 20,000Hz
7. When sound gets reflected from a surface: **(1)**
   a. the angle of reflection is always less than the angle of incidence
   b. the angle of reflection is always equal to the angle of incidence
   c. the angle of reflection is always equal to 90^{o}
   d. the angle of reflection is always more than the angle of incidence
8. What is the range of frequencies associated with a) Infrasound? b) Ultrasound? **(1)**
9. A stone is thrown in a pond. 12 Full ripples are produced in 1 second. If the distance between a crest and a trough is 10 cm, calculate the wavelength and velocity of the wave. **(1)**
10. What is intensity of sound? **(1)**
11. What are longitudinal waves? Give two examples. **(3)**
12. A sound wave travels at a speed of 340 m/s. If the wavelength of wave is 1.4 m, what is the frequency of wave? **(3)**
13. Give two practical applications of reflection of sound waves. **(3)**
14. How does the sound produced by a vibrating object in a medium reach your ear. **(3)**
15. Explain the working and application of a sonar. **(5)**

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Answers

1. a. sound

   Explanation: Sound is a type of energy. Sound travels in the form of wave from one place to another.

2. b. 17 m

   Explanation: If the obstacle is at a distance of 17 m at least, the reflected sound or the echo is heard after 0.1 second.

3. c. (A) and (B) are correct

   Explanation: It has been found that the sensation of sound persists in our ears for 0.1 sec or one-tenth of a second,after the original sound dies off.
   By further calculation,it is found that to hear an echo,the minimum distance from the sound-reflecting surface must be 17.2 m

4. a. 17200 Hz

   Explanation: Frequency of wave = wave speed / wavelength.

   Frequency =$344ms^{-1}/0.02m$ = 17200 Hz

5. a. reflection

   Explanation: Stethoscope is a medical diagnostic instrument based on multiple reflection of sound waves. Megaphone is a horn-shaped tube which are working on reflection of sound waves.

6. a. 25,000 Hz

   Explanation: Children under the age of five can hear sound up to 25,000Hz which is more than normal adult hearing range. As people grow older their ears become less sensitive to higher frequency.

7. b. the angle of reflection is always equal to the angle of incidence

   Explanation: Laws of reflection: (a) Angle of incidence is equal to the angle of reflection. (b) The incident ray, the reflected ray and normal at the point of incidence all lie in the same plane.

8. a. **Infrasound :** Sound waves between the frequencies 1 to 20 Hz.
   b. **Ultrasound:** Sound waves of the frequencies above 20,000 Hz.

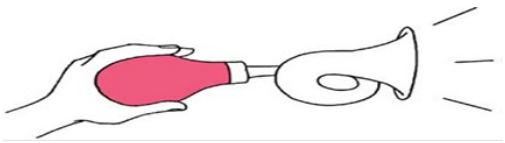
9. Given:
   Distance between the crest and next trough = 10
   or $\lambda/2 = 10$
   $\lambda = 20\text{cm} = 0.20\text{m}$
   velocity $\text{v} = \text{u} \times \lambda$
   $= 12 \times 0.20$ = 2.40 m/s

10. The amount of sound energy passing through unit area each second is called the intensity of sound.

11. The waves in which the particles of medium oscillate to and fro from their mean position in the direction of propagation of waves are called longitudinal waves.
    Examples:
    i. Sound waves in air.
    ii. The waves which travel along the spring (or slinky) when it is pushed and pulled at one end.

12. Speed of sound wave = 340 m/s
    Wavelength of sound wave = 1.4 m
    Frequency = ?
    Since, velocity = Frequency x Wavelength
    $V = \gamma\lambda$
    $340 = \gamma \times 1.4$
    $\frac{340 \times 10}{14} = \gamma$
    $\frac{1700}{7} = \gamma$
    $242.85/s = \gamma(frequency)$

13. Two practical applications of reflection of sound waves
    i. Megaphones or loudhailers, horns, musical instruments such as trumpets and *shehnais*, are all designed to send sound in a particular direction without spreading it in all directions.



ii. A stethoscope is a medical instrument used for listening to sounds produced within the body, chiefly in the heart or lungs. In stethoscopes, the sound of the patient's heartbeat reaches the doctor's ears by multiple reflections of sound.

14. As we speak, the particles of air near our mouth are pushed forward so they get compressed. Then they compress the other particles of air. As the compression proceeds the particles of air near our mouth expand again and thus rarefaction occurs. This process is repeated further and as a result sound wave propagates in the form of compressions and rarefactions to the listener's ear.
15. Sonar is a device that uses ultrasonic waves to measure the distance, direction, and speed of underwater objects.

    Sonar consists of a transmitter and a detector and is installed in a boat or a ship. The transmitter produces and transmits ultrasonic waves. These waves travel through water and after striking the object on the seabed, get reflected back and are sensed by the detector. The detector converts the ultrasonic waves into electrical signals which are appropriately interpreted. The distance of the object that reflected the sound wave can be calculated by knowing the speed of sound in water and the time interval between transmission and reception of the ultrasound. Let the time interval between transmission and reception of ultrasound signal be t and the speed of sound through seawater be v. The total distance, $2d$ travelled by the ultrasound is then, $2d = v \times t$. The above method is called echo-ranging. The sonar technique is used to determine the depth of the sea and to locate underwater hills, valleys, submarine, icebergs, sunken ship etc.