Girls' High School & College, Prayagraj

Worksheet No.- 6

Session 2020-2021

Class - IX (A, B, C, D, E, F)

Subject- Physics

Chapter- Propagation of Sound Waves

Instructions :- Parents are expected to ensure that the student spends two days to read and understand the chapter according to the books and websites referred and thereafter answer the given questions. Student should refer to books of class 6, 7, 8 and also the following books/ websites:

1. Concise Physics, for class- IX, By R. P. Goyal and S. P. Tripathi (Selina Publisher)
2. A New Approach to I.C.S.E. Physics by V. K. Sally and D. Chauhan (Goyal Brothers Prakashan)

Website- https://youtu.be/1Ie-LqptVMw, https://youtu.be/2aTHoOH6r7Q, http://quiznext.in/study-material/learning_material/ICSE-9-Physics/Propagation-of-Sound-Waves/production-and-propagation-of-sound-waves/

Topics:-

1. Production and propagation of sound wave.

2. Infrasonic, sonic and ultrasonic frequencies.

Questions based on Production and Propagation of Sound Wave:

(A) Answer the following questions briefly :-

Q1. How are sound waves produced?

Q2. What is a source of sound?

Q3. What are requisites of the medium to conduct sound wave?

Q4. Name the two kinds of waves in form of which sound travels a medium.

Q5. Define the following terms related to wave motion:

a) amplitude

b) time period

c) frequency

d) wavelength

e) wave velocity

Q6. Draw the displacement – distance graph of a wave.

Q7. How is speed of sound in gas affected by density?

Q8. Compare speed of sound with speed of light.

Q9. How are the wave velocity v, frequency f, and wavelength λ of a wave related? Derive the relationship.

Q10. Explain with an example, the propagation of sound in a medium.

Q11. Name two kinds of waves in form of which sound travels in a medium.

Q12. How is the frequency of a wave related to its time period?

Q13. What is transverse wave? In which medium: solid, liquid or gas, can it be produced?

Q14. Explain the term crest and trough in relation to a transverse wave.

Q15. Flash of lightning reaches us earlier than the sound of thunder. Explain the reason.

Q16. What are the two factors on which the speed of sound in a medium depends?

Q17. How does the speed of sound in air vary with temperature?

Q18. List the factors not affecting the speed of sound in a gas.

Q19. There is no atmosphere on moon. Can you hear each other on the moon's surface? Explain.

Q20. If you place your ear close to an iron railing which is tapped some distance away, you hear the sound twice. Explain why?

Q21. The sound of explosion on the surface of a lake is heard by a boatman 100m away and by a diver 100m below the point of explosion.

(i) Who would hear the sound first : boatman or diver?

(ii) Give reason for your answer in part (i).

(iii) If sound takes time t to reach the boat man, how much time approximately does it take to reach the diver?

Q22. Describe a simple experiment to determine the speed of sound in air. What approximation is made in the method described by you?

Q23. Compare approximately the speed of sound in air, water and steel.

Q24. Describe in brief, with the aid of a labelled diagram, an experiment to demonstrate that a material medium is necessary for the propagation of sound.

Q25. Arrange the speed of sound in gas V_g , solids V_s and liquids V_L in an ascending order.

(B) Multiple Choice Questions:-

1. The correct statement is:

a) Sound and light both require medium for propagation

b) Sound can travel in vacuum, but light can not

c) Sound needs medium, but light does not need medium for its propagation

d) Sound and light both can travel in vacuum.

2. The speed of sound in air at 0^0C is nearly:

a) 1450 m/s

b) 450 m/s

c) 5100 m/s

d) 330 m/s.

3. Sound in air propagates in form of:

a) longitudinal wave

b) transverse wave

c) both longitudinal and transverse wave

d) neither longitudinal and transverse wave.

4. The speed of sound in air is :

a) 3×10^8 m/s

b) 330 m/s

c) 5100 m/s

d) 3×10^{10} m/s.

(C) Numerical Problems :-

Q1. A source of wave produces 40 crests and 40 troughs in 0.4 s. What is the frequency of the wave?

Q2. A boy fires a gun and another boy at a distance hears the sound of fire 2.5 s after seeing the flash. If the speed of sound in air is 340 m/s, find the distance of flash from the observer.

Q3. The heart of a man beats 75 times a minute. What is its (a) frequency and (b) time period?

Q4. A bat can hear sound of frequencies up to 120 kHz. Determine the minimum wavelength of sound which it can hear. Take speed of sound in air to be 344 m/s.

Q5. The time period of simple pendulum is 2 s. Find its frequency.

Q6. A longitudinal wave travels at a speed of 0.3 m/s and the frequency of wave is 20 Hz. Find the separation between the two consecutive compressions.

Q7. The time interval between a lightning flash and the first sound of thunder is 5 s. If the speed of sound in air is 330 m/s, find the distance of flash from the observer.

Q8. How long will sound take to travel in (a) an iron rail and (b) air, both 3.3 km in length? Take speed of sound in air to be 330 m/s and in iron to be 5280 m/s.

<u>Questions based on Infrasonic, Sonic and Ultrasonic Frequencies</u>

(A) Answer the following questions briefly:-

Q1. What do mean by the audible range of frequency?

Q2. For which range of frequencies, human ears are most sensitive?

Q3. What is audible range of frequencies for humans?

Q4. What are infrasonic frequencies?

Q5. Name two animals which can produce infrasonic frequencies.

Q6. State two properties of ultrasound that make it useful to us.

Q7. Write two applications of ultrasounds.

Q8. Write the full form of SONAR. Where it is used?

Q9. Explain how do bats locate the obstacles and prey in their way.

Q10. What is the frequency range used by grasshopper?

Q11. What are supersonic frequencies?

Q12. How are supersonic frequencies different from ultrasonic frequencies?

Q13. How are ultrasonic frequencies used for cleaning minute objects?

Q14. Name the sounds of frequencies given below:

a) 10 Hz

b) 100 Hz

c) 1000 Hz

d) 40 KHz.

Q15. State the approximate speed of ultrasound that make it useful to us.

(B) Multiple Choice Questions:-

1. Sonar make use of :

a) infrasonic sound

b) ultrasound

c) ordinary sound

d) light.

2. A man can hear the sound of frequencies:

a) 1 Hz

b) 1000 Hz

c) 200 kHz

d) 5 MHz

3. The properties of ultrasound that make it useful, are:

a) high power and high speed

b) high power and good directivity

c) high frequency and high speed

d) high frequency and bending around the objects.

4. What is the frequency range of hearing of dogs:

a) 20 Hz – 50 kHz

b) 20 Hz – 20 kHz

c) 20 Hz – 100 kHz

d) 200 Hz – 150 kHz.

(C) Complete the following sentences:

a) An average person can hear sound of frequencies in the range _____ to _____.

b) Ultrasound is of frequency _____.

c) Infrasonic sound is of frequency _____.

d) Bats can produce and hear _____ sound.

e) Elephants produce _____ sound.