CBSE

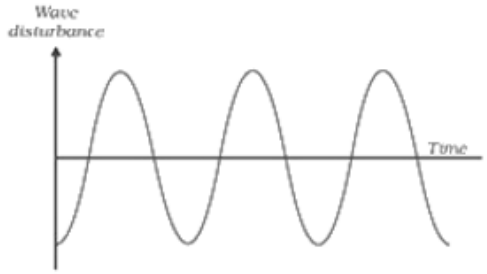
SOUNDS WS 2

Class 09 - Science

Section A

1. Which characteristic of sound is represented in the given image? **[1]**

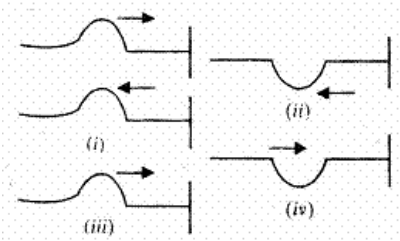
Soft sound



Louder sound

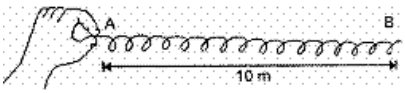
a) Quality
b) Amplitude
c) Pitch
d) Wavelength

2. When a pulse produced in a string moves through it and strikes a rigid pole, it is reflected back and the space of the reflected pulse resembles the shape given is **[1]**



a) (iii)
b) (i)
c) (ii)
d) (iv)

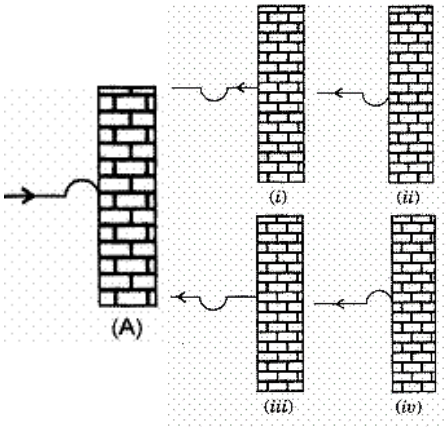
3. What is velocity of pulse for the slinky indicated in the figure below: **[1]**



Given that the pulse took 5 seconds to travel from A to B and then back to A.

a) 5 m/s
b) 4 m/s
c) 8 m/s
d) 10 m/s

4. If the pulse hits at the fixed and as shown in the diagram A. Immediately reflected pulse is: **[1]**



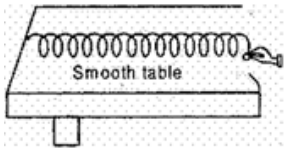
a) (iv)

b) (ii)

c) (iii)

d) (i)

5. A student sets up a slinky on a smooth table top in the manner shown here. He can produce a pulse in the slinky by giving a jerk to its free end: **[1]**



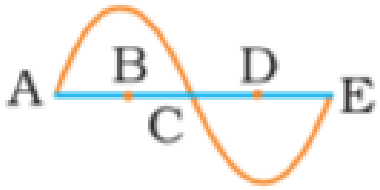
a) backward and forward along the length of the slinky

b) at an angle of 45 with the table top

c) towards left

d) downwards

6. In the curve figure, half the wavelength is **[1]**



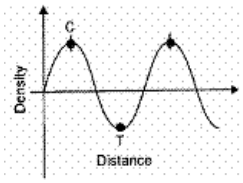
a) A E

b) B D

c) A B

d) D E

7. The separation between T and C in the figure given is **[1]**



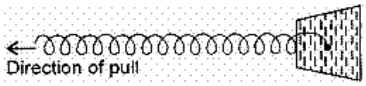
a) $\frac{\lambda}{2}$

b) λ

c) 4λ

d) 2λ

8. A slinky, 5 m long, is tied to the hook in a wall and its other end is held tightly. It is then pulled as shown, and released suddenly. **[1]**



The disturbance created on the slinky are :

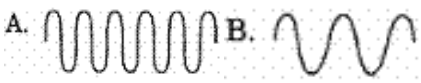
a) Longitudinal waves

b) Transverse pulse

c) Transverse waves

d) Longitudinal pulse

9. The pitch of the two signals A and B shown below are P_A and P_B respectively. Then **[1]**



a) $P_A > P_B$ b) $P_A < P_B$

c) $P_A = 2P_B$ d) $P_A = P_B$

10. Wave motion is a periodic _____ produced by a vibrating body. **[1]**

a) Energy b) Disturbance

c) oscillations d) Momentum

11. Compressions and rarefactions are formed in a _____ wave. **[1]**

a) Longitudinal b) Transverse

c) Infrasonics d) Both longitudinal and Transverse

12. Separation between compression and rarefaction is _____ the wavelength. **[1]**

a) half b) one fourth

c) one third d) twice

13. The frequency of a source of sound is 546 Hz. It vibrates _____ times in a second. **[1]**

a) 1092 b) 546

c) $\frac{1}{546}$ d) 223

14. The distance between two consecutive compressions or rarefactions in a wave is given by_____. **[1]**

a) 2λ b) λ

c) $\frac{\lambda}{2}$ d) $\frac{\lambda}{4}$

15. Statement A: Speed of sound is same at different temperature **[1]**

Statement B: Loudness is measured in decibels.

Which of the two statements is true?

a) Both A and B b) Neither statement A nor statement B

c) Statement B d) Statement A

16. **Statement A:** Speeds greater than the speed of sound in the air are called infrasonic speed. **[1]**

Statement B: The amount of sound energy, passing each second through unit area is called intensity of sound.

Which of the above two statements is true?

a) Both A and B b) Statement A

c) Statement B d) Neither A nor B.

17. **Statement A:** Molecules also move from one place to another in a wave motion. **[1]**

Statement B: Electromagnetic waves don't need a material medium to travel.

Which of the two statements is/are true?

a) Statement B b) Neither A or B

c) Both A and B d) Statement A

18. **Statement A:** Sound travels faster in summer season than in winter season **[1]**

Statement B: The speed of sound does not depend on the pressure of the medium. If the temperature of the medium remains constant

Which of the two statements is true?

a) Neither A nor B
b) Statement B
c) Statement A
d) Both A and B

19. **Statement A:** An object moving at a speed greater than that of a sound is moving at ultrasonic speed. **[1]**

Statement B: In wave motion, only energy is transferred.

Which of the two statements is true?

a) Statement B
b) Both A and B
c) Statement A
d) Neither A or B

20. Which of the following is incorrect- **[1]**

A. SI Unit of frequency is hertz

B. SI Unit of wavelength is ms^{-1}

C. SI Unit of velocity is ms^{-2}

D. SI unit of time period is sec

a) A and B are incorrect
b) A, B and C are incorrect
c) B and C are incorrect
d) All of these

21. Which of the following is incorrect? **[1]**

A. Unit of frequency is hertz

B. Unit of wavelength is m/s

C. Unit of velocity is m/s^2

D. Unit of the time period is second

a) B and C
b) All of these
c) A and C
d) B and D

22. Find the incorrect statement. **[1]**

A. The speed of the wave doesn't depend on properties of the medium.

B. Ultrasound is produced by electronic oscillator.

C. 120 dB means intensity is 1 W/m^2.

D. The distance between crest and trough is $\frac{\lambda}{2}$.

a) (D)
b) (A)
c) (B)
d) (C)

23. The correct statement in the following is: **[1]**

A. Sound waves are longitudinal and light waves are transverse

B. Sound waves and light waves are both longitudinal waves

C. Sound waves are transverse and light waves are longitudinal

D. Both sound waves and light waves are transverse

a) (B)
b) (A)

c) (C) d) (D)

24. A pulse was created in a slinky/string of length 4 m by a group of students. They observed that it returned, after reflection, at the point of creation 6 times in 10 seconds and calculated the speed as follows: **[1]**

Students	A	B	C	D
Speed m/s	0.4	2.4	4.8	9.6

The correct speed was calculated by the student:

a) B b) D

c) A d) C

Section B

25. Match the following Column A with Column B: **[2]**

Column A	**Column B**
(a) Amplitude	(i) The number of complete oscillations per second
(b) Frequency	(ii) The magnitude of maximum disturbance in the medium on either side of the mean position
(c) Wavelength	(iii) The time taken for one complete oscillation in the density (or pressure) of the medium
(d) Time period	(iv) The distance between two consecutive compressions or two consecutive rarefactions

26. Match the following Column A with Column B: **[2]**

Column A	**Column B**
(a) Frequency	(i) λ
(b) Hertz	(ii) v
(c) Wavelength	(iii) T
(d) Time period	(iv) Hz

27. Match the following Column A with Column B: **[2]**

Column A	**Column B**
(a) The portion of the medium where density has a value smaller than its average value	(i) Crest
(b) A region of rarefied air	(ii) Frequency
(c) The number of complete oscillations per second	(iii) Trough
(d) The portion of the medium where density has a value larger than its average value	(iv) Rarefaction

28. Match the following Column A with Column B: **[2]**

Column A	**Column B**
(a) The sound produced by a mixture of several frequencies	(i) Echo
(b) The repetition of sound caused by reflection of sound waves from an obstacle	(ii) Pitch
(c) The physiological sensation which helps in distinguishing a shrill sound from a flat sound	(iii) Loudness

(d) The physiological response of the ear to the intensity of sound	(iv) Note

29. Match the following Column A with Column B: **[2]**

Column A	Column B
(a) A region of compressed air	(i) Frequency
(b) The number of complete oscillations per second	(ii) Time period
(c) The time is taken for one complete oscillation	(iii) Tone
(d) A sound of single frequency	(iv) Compression

30. A sound wave travels at a speed of 339 ms^{-1}. If its wavelength is 1.5 cm, what is the frequency of the wave? Will it be audible? **[2]**

31. When vertically jerk is given to a string, transerve waves are formed. Give three features of these waves. **[2]**

32. The frequency of a source of sound is 100 Hz. How many times does it vibrate in a minute? **[2]**

33. Two children are at the opposite ends of a long iron pipe. One of them strikes the end of iron pipe with a stone. Find the ratio of time taken by the sound waves in air and in iron to reach the other child. (Speed of sound in air = 340 ms^{-1} and speed of sound in iron is 5130 ms^{-1}). **[2]**

34. Prove that $V = \upsilon\lambda$, where the symbols have their usual meanings. **[2]**

35. A person has hearing range of 20 Hz to 20 kHz. Calculate the wave lengths of sound waves in air corresponding to above frequencies? Take speed of sound in air as 340 ms^{-1}. **[2]**

36. What do you understand by loud and soft sound? **[2]**

37. Cite an experiment to show that sound needs a material medium for its propagation. **[2]**

38. The wavelength of waves produced on the surface of water is 20 cm. If the wave velocity is 24 ms^{-1}, calculate **[2]**
(a) the number of waves produced in one second
(b) the time required to produce one wave.

39. Which wave property determines **[2]**
a. loudness,
b. pitch?

40. Sound requires a medium to travel? Justify experimentally. **[2]**

41. A human heart on an average is found to beat 75 times a minute. Calculate its frequency. **[2]**

42. Define :- **[2]**
a) Time Period
b) Amplitude of a wave

43. A boat at anchor is rocked by waves, whose consecutive crests are 100 m apart. If the wave velocity of moving crests is 20 ms^{-1}, calculate the frequency at which the boat will rock? **[2]**

44. A wave is moving in the air with a velocity of 340 m/s. Calculate the wavelength if its frequency is 512 Hz. **[2]**

45. What is loudness of sound? What factors does it depend on? **[2]**

46. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen. why? **[2]**

47. A person is listening to a tone of 500 Hz sitting at a distance of 450 m from the source of the sound. What is the time interval between successive compressions from the source? **[2]**

48. A stone is dropped from the top of a tower 500 m high into a pond of water at the base of the tower. When is the splash heard at the top? Given, g = 10 ms^{-2} and speed of sound = 340 ms^{-1}. **[2]**

49. A person has a hearing range from 20 Hz to 20 kHz. What are the typical wavelengths of sound waves in air corresponding to these two frequencies? Take the speed of sound in air as 344 ms^{-1}. **[2]**

50. Establish the relationship between the speed of sound, its wavelength, and frequency. If the velocity of sound in air is 340 ms^{-1}. Calculate **[2]**

    i. wavelength when the frequency is 256 Hz.

    ii. frequency when the wavelength is 0.85 m.

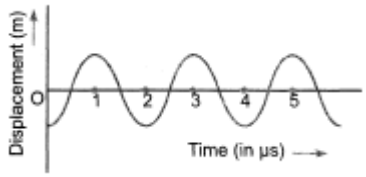
51. A stone is dropped in a well 44.1 m deep. The sound of splash is heard, 3.13 s after the stone is dropped. Find the velocity of the sound in air. (Take g = 9.8 ms^{-2}) **[2]**

52. A longitudinal wave of wavelength 1 cm travels in air with a speed of 330 m/s. Calculate the frequency of the wave. Can this wave be heard by a normal human? **[2]**

53. Explain how sound is produced by your school bell. **[2]**

54. Why do we see light first and hear the sound later during thunderstorm? **[2]**

55. The given graph shows the displacement versus time travelling with velocity of 1500 ms^{-1}. Calculate the wavelength of the disturbance. **[2]**



56. A sound wave has a frequency of 2 kHz and wave length 35 cm. How long will it take to travel 1.5 km? **[2]**

57. How are the wavelength and frequency of a sound wave related to its speed? **[2]**

58. A sound wave has a frequency 2 kHz and wavelength 40 cm. How long will it take to travel 1.6 km? **[2]**

59. How does the sound produced by a vibrating object in a medium reach your ear? **[2]**

60. Describe with the help of a diagram, how compressions and rarefactions are produced in air near a source of sound. **[2]**

61. What are wavelength, frequency, time period and amplitude of a sound wave? **[2]**

62. Why are sound waves called mechanical waves? **[2]**

63. A longitudinal wave is produced on a toy slinky, such that frequency of wave is 20 Hz and the speed of the wave is 30 cms^{-1}, What is the minimum separation between the consecutive compressions on the slinky? **[2]**

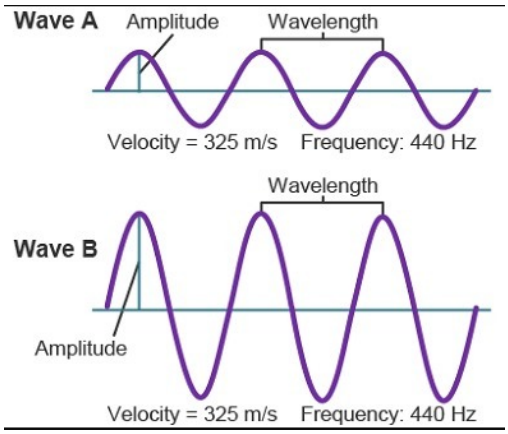
64. A sound wave of wavelength 0.332 m has a time period of 10^{-3}s. If the time period is decreased to 10^{-4}s, calculate the wavelength and frequency of new wave. **[2]**

65. Distinguish between loudness and intensity of sound. **[2]**

Section C

66. Two children are at opposite ends of an aluminium rod. One strikes the end of the rod with a stone. Find the ratio of times taken by the sound wave in air and in aluminium to reach the second child. **[3]**

67. Observe the given figure and answer the following questions: **[3]**



i. Identify the characteristics of the two graphs as shown above in the given figure.

ii. What is the relationship between the velocity of sound, its wavelength, and frequency?

iii. What is the term for the magnitude of the maximum disturbance in the medium on either side of the mean value?

iv. Give the unit of frequency?

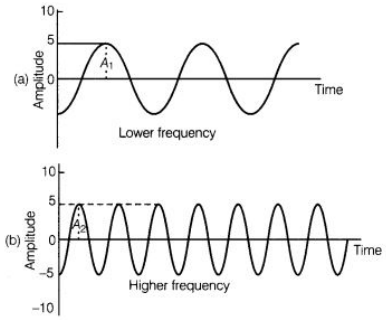
68. Kunal and Abhimanyu were waiting to go across a railway crossing. Kunal jumped over the barrier and curiously put his ear on the railway track. Abhimanyu opposed Kunal and pulled him away from the railway track. **[3]**

a. Why did Kunal put his ear on the railway track?

b. Can sound travel faster through (i) copper (ii) water?

c. Why did Abhimanyu pull Kunal away from the railway track?

69. Observe the following graphical diagram and answer the following questions: **[3]**



i. What is represented by the graphical diagram shown above?

ii. Which wave characteristic determine the pitch of sound?

iii. What is the relationship between pitch and frequency?

70. Kanika carried out an experiment on determination of speed of sound in air using resonance tube apparatus and obtained absurd results. She should **[3]**

a. record the result as such.

b. manipulate the result and report the answer nearer to actual value of velocity of sound in air.

c. copy the result obtained by another student.

d. report the result as such and discuss the matter with the teacher to find out the reasons for wrong results.

Answer the following questions based on the above information:

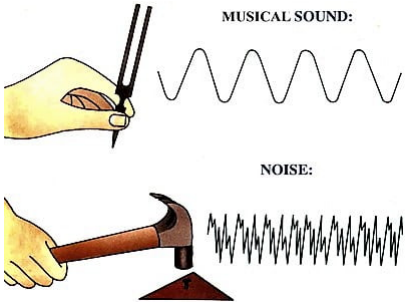
i. Which is the most appropriate option for Kanika?

ii. What values will Kanika be promoting through preferring this option?

iii. Give one more example of promoting such values in real life situations.

71. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen, why? **[3]**

72. Observe the following diagram and answer the following questions: **[3]**



i. What is the difference between longitudinal and transverse wave?

ii. Mention the three characteristics of sound.

iii. What is the crest and trough?

Section D

73. Draw a curve showing density or pressure variations with respect to distance for a disturbance produced by sound. Mark the position of compression and rarefaction on this curve. Also, define wavelengths and time period using this curve. **[5]**

74. i. Sound is produced when your school bell is struck with a hammer. Why? **[5]**

ii. A powerful sound signal sent from a ship is received again after 4.8 seconds. How deep is the ocean bottom? (Speed of sound in water = 1500 m/s).

75. i. What is echo ranging? State any one application of this technique. **[5]**

ii. The wavelength of waves produced on the surface of the water is 20 cm. If the wave velocity is 36 m/s. Calculate

a. The number of waves produced in one second.

b. The time required to produce one wave?