



PHYSICS

NCERT - NCERT PHYSICS(ENGLISH)

SOUND

Solved Examples

1. A sound wave has a frequency of $2k\text{Hz}$ and wavelength 35cm . How long will it take to travel 1.5km ?



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2. A person clapped his hands near a cliff and heard the echo after 2 s. what is the distance of the cliff from the person if the speed of the sound. v is taken as 346 m s^{-1} ?



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3. A ship sends out ultrasound that returns from the seabed and is detected after 3.42 s . If

the speed of the ultrasound through sea water is $1531\text{m} / \text{s}$, what is the distance of the seabed from the ship ?



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Exercise

1. How does the sound produced by a vibrating object in a medium reach your ear ?



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2. Explain how sound is produced by your school bell ?



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3. Why are sound waves called mechanical waves ?



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4. Suppose you and your friend are on the Moon. Will you be able to hear any sound produced by your friend ?



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5. Which wave property determines

(a) loudness

(b) Pitch ?



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6. Guess which has a higher pitch : a guitar or a car horn ?



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7. What are wavelength, frequency, time period and amplitude of a sound wave ?



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8. How are the wavelength and frequency of a sound wave related to its speed ?



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9. Calculate the wavelength of a sound wave whose frequency is 220Hz and speed is 440m/s in a given medium.



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



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11. Distinguish between loudness and intensity of sound.



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12. In which of the three media : air, water or iron , does sound travel the fastest at a particular temperature ?



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13. An echo is returned in $3s$. What is the distance of the reflecting surface from the source, given that the speed of sound is $342m / s$.



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14. Why are the ceilings of concert halls curved ?



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15. What is the audible range of the average human ear ?



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16. What is the range of frequencies associated with

(a) infra sound

(b) ultrasound ?



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17. A submarine emits a sonar pulse, which returns from an underwater cliff in $1.02s$. If the speed of sound in water is $1531m/s$, how far away is the cliff ?





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18. What is sound and how is it produced ?



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19. Describe with the help of a diagram, how compressions and rarefactions are produced in air near a source of sound.



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20. Cite an experiment to show that sound needs a material for its propagation.



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21. Why is sound wave called a longitudinal wave ?



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22. Which characteristic of the sound helps you to identify your friend by his voice while

sitting with others in a dark room ?



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23. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen, why ?



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24. A person has a hearing range from $20Hz$ to $20kHz$. What are the typical wavelength of

sound waves in air corresponding to these two frequencies ? Take the speed of sound in air as 344m / s .



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25. 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.



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26. The frequency of a source of sound is 100Hz . How many times does it vibrate in a minute ?



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27. Does sound follow the same laws of reflection as light does ? Explain.



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28. When a sound is reflected from a distant object, an echo is produced. Let the distance between the reflecting surface and the source of sound production remain the same. Do you hear echo sound on a hotter day ?



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29. Give two practical applications of reflection of sound waves.



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30. A stone is dropped from the top of a tower $500m$ high into a pond of water at the base of the tower. When is the splash heard at the top ? Given, $g = 10m/s^2$ and speed of sound $= 340m/s$.



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31. A sound wave travels at a speed of $339m/s$. If its wavelength is $1.5cm$, what is the frequency of the wave ? Will it be audible ?





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32. What is reverberation ? How can it be reduced ?



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33. What is loudness of sound ? What factors does it depend on ?



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34. Explain how bats use ultrasound to catch a prey.



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35. How is ultrasound used for cleaning ?



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36. Explain the working and application of a sonar.



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37. A sonar device on a submarine sends out a signal and receives an echo $5s$ later. Calculate the speed of sound in water if the distance of the object from the submarine is $3625m$,



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38. Explain how defects in a metal block can be detected using ultrasound.



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39. Explain how the human ear works.



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