



# PHYSICS

## NCERT - NCERT PHYSICS(HINGLISH)

### SOUND

#### Solved Examples

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



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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  $346 \text{ m s}^{-1}$ ?



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3. A ship sends out ultrasound that returns from the seabed and is detected after  $3.42 \text{ s}$ . 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  $220\text{Hz}$  and speed is  $440\text{m/s}$  in a given medium.



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10. A person is listening to a tone of  $500\text{Hz}$  sitting at a distance of  $450\text{m}$  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  $344\text{m} / \text{s}$ .



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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  $100\text{Hz}$ . 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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