doubtnut
India's Number 1 Education App

PHYSICS

BOOKS - PRADEEP PHYSICS (HINGLISH)

SOUND

Solved Problem

1. Find the frequency of a wave whose time period is 0.002 second.

A. 500 Hz

B. 400 Hz

C. 550 Hz

D. 450 Hz

Answer: A

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2. Find the time period of a wave whose frequency is $400Hz$.

A. 0.025 s

B. 0.00025 s

C. 0.0025 s

D. 0.25 s

Answer: C

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3. A source of wave produces 20 crests and 20 throughs in 0.2 s. Find the frequency of the wave.

A. 100 Hz

B. 200 Hz

C. 300 Hz

D. 400 Hz

Answer: A

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4. The wavelength of the vibrations produced on the surface of water is $2cm$. If the wave velocity is $16m/s$, calculate.

(a) the number of waves produced in $1s$.

(b) time required to produce $Iwave$.

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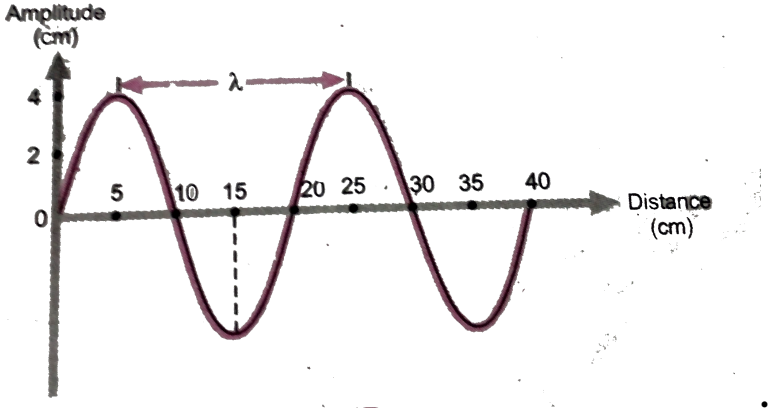
5. shows a snapshot of a wave-form of frequency $50Hz$. For this wave motion, find

(a) wavelength

(b) amplitude

(c) velocity.



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6. A sound wave has a frequency $1000Hz$ and wavelength $34cm$. How long will it take to move through $1km$?

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7. A tuning fork having frequency $256Hz$ emits a wave which has a wavelength of $1.35m$. Find the speed of sound in air.

A. $256m/s$

B. $345.6m/s$

C. $245.6m/s$

D. $355.6m/s$

Answer: B

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8. The speed of sound in sea water is $1530 m / s$. The wavelength of a wave transmitted through the sea is $0.02 m$. Find its frequency.

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9. The audible range of a human ear is 20 Hz to 20 kHz. Convert this into corresponding

wavelength range. The speed of sound at ordinary temperature is $340m/s$.

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10. A stone is dropped into a well $45m$ deep. The sound of the splash of the splash is heard $3.13s$ after the stone is dropped. Find the speed of sound in air. Take $g = 10m/s^2$.

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11. A boy hears an echo of his own voice from a distant hill after $1s$. The speed of sound is $340m/s$. What is the distance of the hill from the boy ?

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12. A boy standing in front of wall at a distance of $85m$ produces 2 claps per second. He notices that the sound of his clapping coincides with the echo. The echo is heard

only once when clapping is stopped. Calcualte the speed of sound.

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13. A man stationed between two parallel cliffs fires a gun. He hears the first echo after $1.5s$ and the next after $2.5s$. What is the distance between the cliffs and when does the hear the third echo ? Take the speed of sound in air as $340m/s$.

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14. A man fires a shot and hears an echo from a cliff after $2s$. He walks $85m$ towards the cliff and the echo of a second shot is now heard after $1.4s$. What is the velocity of sound and how far was the man from the cliff when he first heard the echo ?

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15. It takes $2.4s$ to record the echo of a sonar. If the speed in water is $1450m/s$, find the

depth of the ocean floor.

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16. A ship which is stationary, is at a distance of $2900m$ from the seabed. The ship sends an ultrasound signal to the seabed and its echo is heard $4s$. Find the speed of sound in water.

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Ncert Questions And Exercise

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

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

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3. Why are sound waves called mechanical waves ?

A. Because they travel with the speed of light

B. Because they do not require any material medium for propagation

C. Because they need material medium for propagation

D. None of these

Answer: C

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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 ?

A. Yes, but it will depend upon the distance between me and my friend

B. No, because there is no atmosphere on the moon

C. Yes, sound waves can travel anywhere

D. Cannot be determined

Answer: B

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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.

A. 1 m

B. 4 m

C. 1.5 m

D. 2 m

Answer: D

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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 ?

A. $\frac{1}{500}s$

B. $\frac{450}{500}s$

C. $\frac{500}{450}s$

D. $500s$

Answer: A

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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) insfrasound

(b) ultrasound ?

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17. A submarine emits a sonar pilse, 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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Ncert Exercise

1. What is sound and how is it produced ?

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

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3. Cite an experiment to show that sound needs a meterial for its propagation.

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4. Why is sound wave called a longitudinal wave ?

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5. 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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6. Flash ans thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen, why ?

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7. A person has a hearing range from $20Hz$ to $20kHz$. What are the typical wavelength of sound waves in sir corresponding to these two frequencies ? Take the speed of sound in air as $344m/s$.

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

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

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11. 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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12. Give two practical applications of reflection of sound waves.

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

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

Watch Video Solution

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

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

Watch Video Solution

18. How is ultrasound used for cleaning ?

Watch Video Solution

19. Explain the working and application of a sonar.

Watch Video Solution

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

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22. Explain how the human ear works.

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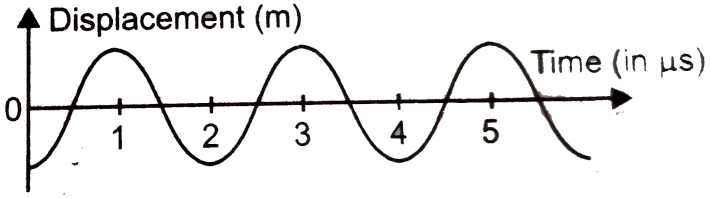
Short Answer Question

1. The displacement versus time relation for a disturbance travelling with velocity of $1500 m/s$. Calculate the wavelength of the disturbance.



A. $4 \times 10^{-3} m$

B. $1 \times 10^{-3} m$

C. $3 \times 10^{-3} m$

D. $2 \times 10^{-3} m$

Answer: C

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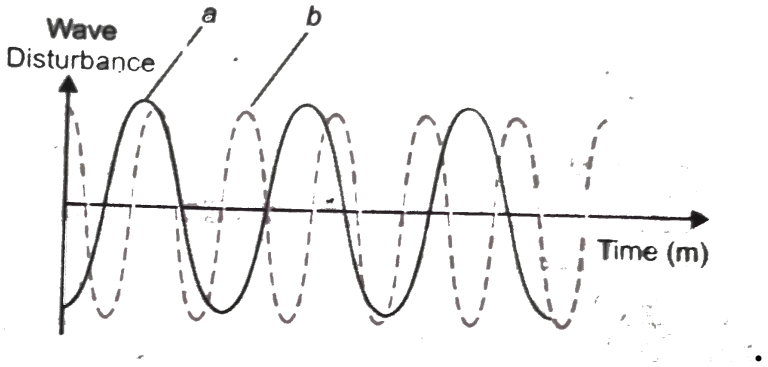
2. Which of the above two graphs : (a) and (b)the human voice is likely to be the male voice ? Give reson for your answer.



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3. A girl is sitting in the middle of a park of dimension $12m \times 12m$. On the left side of it there is a building adjoining the park and on right side of the park, there is a road adjoining the park. A sound is produced on the road by a cracker. Is it possible for the girl to hear the echo of this sound ? Explain your answer.

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4. why do we hear the sound produced by the humming bees while the sound of vibrations of pendulum is not heard ?

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5. If any explosion takes place at the bottom of a lake, what type of shock waves in water will take place ?

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6. Sound produced by a thunderstrom is heard $10s$ after the lighting is seen. Calculate the approximate distance of the thunder cloud. (Given speed of sound $= 340m/s$).

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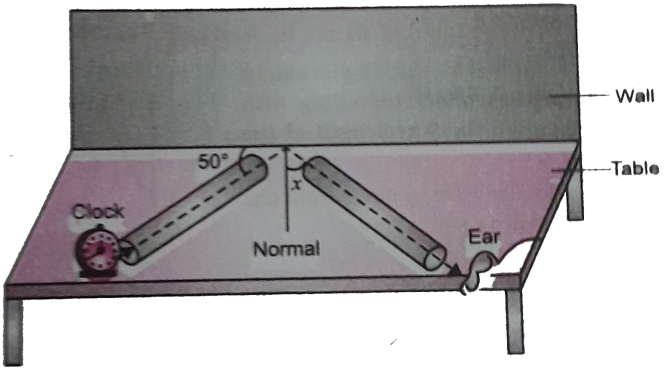
7. For hearing the loudest ticking sound heard by the ear, find the angle 1x



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8. Why are the ceilings of concert halls curved ?

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9. Represent graphically by two separate diagrams in each case :

(i) Two sound waves having the same amplitude but different frequencies.

(ii) Two sound waves having the same frequency but different amplitudes.

(iii) Two wound waves having different amplitudes and also different wavelengths.

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10. Establish the relationship between speed of sound, its wavelenth and frequency. If velocity of sound in air is $340 m / s$, calculate :

(i) wavelength when frequency is $256 Hz$.

(ii) frequency when wavelength is $0.85 m$.

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11. 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.

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Very Short Answer

1. What experimental evidence is there fro assuming that the speed of sound is the same for all the wavelengths ?

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2. When you shout in front of a hill, your own shout is repeated. Explain.

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3. Write the name of the wave which propagates in terms of compressions and rarefactions.

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4. Can sound waves travel through vaccum ?

Watch Video Solution

5. What is audible range ?

Watch Video Solution

6. What are ultrasonics ?

Watch Video Solution

7. What are infrasonics ?

Watch Video Solution

8. What is a sonic boom ?

Watch Video Solution

9. What is sound barrier ?

Watch Video Solution

10. What propagates along with the waves ?

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11. A violin and a sitar may have the same frequency, yet we can distinguish between their notes. Why ?

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12. What is acoustical transite ?

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13. Can you produce sound without utillizing energy ?

Watch Video Solution

14. When a bird flaps its wings, do you hear any sound ?

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15. What is a tone ?

Watch Video Solution

16. What is a note ?

Watch Video Solution

17. What is persistence of hearing ?

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18. By how much does the speed of sound increase with rise of temperature ?

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19. What is the minimum distance of the obstacle from the source of sound for hearing distinct echo ?

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Short Answer

1. Why cannot we hear an echo in a small room ?

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2. A boy stands at one end of a corridor, both the doors of which are closed. When he claps his hands together, the echo of the hand clap continues for a few seconds with decreasing loudness.. Why ?

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3. There are no echoes produced in small living rooms. Explain why echoes are produced only in large galleries and halls.

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4. The sound of distant horses can br heard by applying the ear to the ground whereas it is inaudible if the ear is held a little distance above the ground. Explain.

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5. A large auditorium has a curved back. Explain.

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6. What is the difference between an echo and a reverberation ?

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7. Where is reverberation desirable and where is this to be avoided ?

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8. Why do we use upholstered seats in theatres and halls ?

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9. How can you make a building sound proof ?

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10. The reverberation time is larger for an empty hall than for a crowded hall. Why ?

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11. What is sound ? Discuss the method of its production.

Watch Video Solution

12. How is sound propagated through a material medium ? What is wave motion ?

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13. Discuss the role of medium in the propagation of sound.

Watch Video Solution

14. How are compressions and rarefactions produced near a source of sound ?

Watch Video Solution

15. How can you show that sound waves are longitudinal waves ?

Watch Video Solution

16. What are transverse waves ?

Watch Video Solution

17. Obtain a relation between speed, frequency and wavelength of a wave.

Watch Video Solution

18. What is sonic boom and when is it heard ?

Watch Video Solution

19. Distinguish between music and noise.

Watch Video Solution

20. Describe an experiment to show that sound waves can be reflected. What are the laws of reflection of sound waves.

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21. What do you mean by reverberation and reverberation time ? How is reverberation controlled ?

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22. What is the range of frequencies of audio waves, infrasonics and ultrasonics ?

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Long Answer

1. What are the characteristics of a sound ? Discuss each one of them briefly.

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2. What is echo ? How is it formed ?

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3. What are multiple echoes ? Discuss any two of their important practical applications.

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4. What is ultrasound ? Describe some of its practical applications ?

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5. What is SONAR ? How is it used to detect an underwater object and measure its distance ?

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6. Discuss the structure of human ear from auditory aspect only.

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Higher Order Thinking

1. We see flash earlier than the thunder. Discuss.

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2. Does the sound of a bomb explosion travel faster than the sound produced by a human bee ?

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3. On what factors does the speed of sound in a material depend ?

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4. If an observer places his ear at the end of a long pipe, he can hear two distinct echoes when the pipe is hammered at the other end. Explain.

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5. Deaf people can be made to dance to music. Explain how ?

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6. What travels faster : a radio signal or sound in air ?

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7. What travels faster : a rifle bullet or the sound of the shot fired from it ?

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8. Explain why there is usually a time interval between observing a flash of lighning and hearing its thunder. Account for the rolling sound which is often produced when the thunder is heard.

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9. If you set your watch by the sound of a distant siren, will it go fast or slow ?

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Value Based Question

1. Hearing may be damaged by excessive noise. So our ear sometimes need protection from continuous loud sound. Hearing damage depends on the sound intensity level (decibel

level) and the exposure time, and the exact combinations vary for different people. Normally, at $90dB$, it takes $8hours$ or less for the damage to receptor nerves to occur. further, it is found that if the sound level is increased by $5dB$, the safe exposure limit is cut to half.

(a) How long will it take for a sound of a very loud lawn mower (or a motorcycle) of $95dB$ to damage the hearing ?

(b) What is the nonstop exposure time for a $105dB$ sound to damage the ear ?

(c) What should be done to protect the

society from the danger of losing the divine gift of hearing power ?

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2. Try to imagine what you would feel, what short of person you would be, had you been born totally deaf.

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3. Sounds we hear inform us of the state of world around us, especially of that part of it which our other senses, such as touch and sight, cannot reach. Illustrate this with appropriate examples.

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4. Today our life is richer and fuller of music than it was yesterday, and much of this is due to progress in engineering. What will happen

to human feelings when the sea of knowledge spreads further ?

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Problem For Practice

1. A boat anchor is rocked by waves whose consecutive crests are $100m$ apart. If the wave speed of the moving crests is $20m/s$, calculate the frequency at which the boat rocks.

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2. Calculate the wavelength of a sound wave having a frequency $300Hz$ and speed $330m/s$.

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3. The sonic boom of an aircraft has a time perios of $0.00005s$. Calculate the frequency of the sound produced.

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4. A periodic longitudinal wave is send on a slinky. The wave proceeds at a speed of $48m/s$ and each particle oscillates at a frequency of $12Hz$. Calculate the minimum separation between the positions where the slinky is most compressed.

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5. A source produces 15 crests and 15 throughs in 3 seconds. When the second crest in

produced, the first is $2cm$ away from the source. Calculate (a) frequency (b) wavelength (c) speed of the wave.

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6. A longitudinal wave is produced on a slinky. The frequency of the wave is $25Hz$ and it travels at a speed of $20cm/s$. Find the separation between consecutive positions of maximum compressions.

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7. A sound wave has a frequency of $2kHz$ and wavelength $35cm$. How long will it take to travel $1.5km$?

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8. A hosptital uses an ultrasonic scanner to locate tumours in a tissue. What is the wavelength of sound in a tissue in which the speed of sound is $1.7km/s$? The operating frequency of the scanner is $4.2MHz$.

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9. An observer standing at the sea coast observes $54 waves$ reaching the coast per minute. If the wavelength of a wave is $10 m$, find the wave velocity.

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10. How far does sound travel in air when a tuning fork of frequency $560 Hz$ makes 30

vibrations ? Speed of sound in air $= 336 m / s$.

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11. A bat emits ultrasound sound of frequency $100 kHz$ in air. If this sound meets a water surface. What is wavelength of (a) the reflected sound wave (b) the trasmitted sound wave ?

Given speed of sound in air $= 340 m / s$ and in water $= 1486 m / s$.

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12. A wave of wavelength $0.60cm$ is produced in air and it travels at a speed of $300m/s$. Will it be audible ?

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13. Radio Ceylon broadcasts at $25m$. What is the frequency of the station ?

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14. Chandigarh radio station broadcasts at $1200kHz$. At what Chandigarh station would be tuned in your transistor ?

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15. A person clapped his hands near a cliff and heard the echo after $5s$. What is the distance of the cliff from the person if the speed of the sound, v is taken as $346m/s$?

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16. A child hears an echo from a cliff $4s$ after the sound of a powerful cracker is produced. How far away is the cliff from the child ? (Take speed in air as $340m/s$) ?

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17. An observer standing between two cliffs fires a gun. He hears one echo after $1.5s$ and another after $3.5s$. If the speed of sound is $340m/s$, find.

(a) the distance of the observer from the first

cliff and.

(b) distance between the cliffs.

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18. A boy stands $60m$ in front of a tall wall and claps. The boy continues to clap every time an echo is heard. Another boy dindds that the time between the first(1 st) and the fifty first (51 st) clap is $18s$. Calculate the speed of sound.

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19. A person standing between two vertical cliffs and $680m$ away from the nearst cliff, shouted. He heard the first echo after $4s$ and the second echo $3s$ later. Calculate (a) the speed of sound in air and (b) distance between the two cliffs.

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20. A man standing at $51m$ from a wall fires a gun. Calculate the time after which an echo is

heard. The speed of sound is $340m/s$.

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21. A man fires a gun towards a hill and hears its echo after $5s$. He then moves $340m$ towards the hill and fires his gun again. This time he hears the echo after $3s$. Calculate the speed of sound.

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22. A engine is approaching a hill at constant speed. When it is at a distance of $0.9km$, it blows a whistle, whose echo is heard by the driver after $5s$. If the speed of sound is $340m/s$, calculate the speed of the engine.

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23. A ship sends out ultrasound that returns form the seabed and is detected after $3.42s$. If the speed of the ultrasound through sea

water is $1531 m / s$, what is the distance of the seabed from the ship ?

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24. A sonar emits pulses on the surface of water which are detected after reflection from its bottom at a depth of $1531 m$. If the time interval between the emission and detection of the pulse is $2 s$, find the speed of sound in water.

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6 A Formative Oral Testing

1. What is sound ?

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2. How is sound produced ?

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3. What type of waves are sound waves ?

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4. What is a crest ?

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5. What is the unit of frequency ?

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6. What is a rarefaction ?

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7. What is meant by an oscillation in the context of sound ?

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8. What is meant by amplitude in the context of sound ?

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9. What is the speed of sound in air at $0^{\circ} C$?

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10. In which medium does the sound travel faster : solid or gaseous ?

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6 A Formative Quiz Testing

1. (a) Does the medium through which sound passes also move ?

(b) What role does a medium play in the propagation of sound ?

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2. (a) What is the temperature coefficient of speed of sound ?

(b) Does speed of sound depend on pressure ?

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3. (a) What type of phenomenon creates sound ?

(b) What is the wavelength of a sound wave ?

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4. (a) What is the speed of sound in air at $0^{\circ} C$ in miles per hour ?

(b) What is the approximate value od speed of sound in air at $20^{\circ} C$ in km/s ?

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5. (a) What is the relation of wavelength (lamda) of a sound wave with its speed (v) and frequency (v) ?

(b) How is the time period (T) related to the frequency of a wave ?

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6 A Formative Worksheet 1

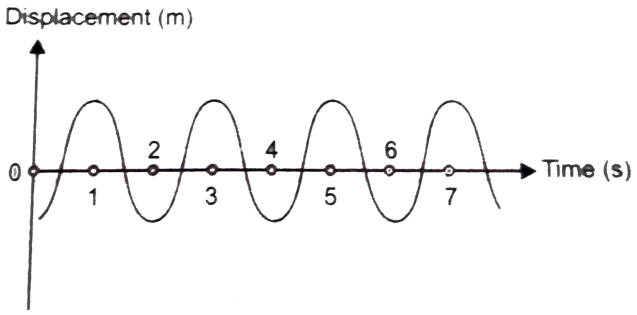
1. the displacement veres time relation for a disturbance travelling with a velocity of $1500 m / s$.

Calcuate the :

(i) time period

(ii) frequency

(iii) wavelength of the disturbance.



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2. The velocity of sound in air is $340 m / s$.

Compute :

(i) its wavelength when the frequency is $250 hz$

.

(ii) its frequency when the wavelength is $85 cm$.

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6 A Formative Worksheet 2

1. Does a $220Hz$ sound wave move faster, slower, or at the same speed as a $440Hz$ sound wave ?

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2. How far will a $200hz$ sound travel as compared to an $800Hz$ sound ?

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3. If a tree falls in the forest where there in no one to hear, does it make a sound ?

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4. Suppose you throw someone a ball, thereby transporting kinetic energy. Could you consider the motion of the ball to be a mechanical wave ?

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5. Would it be possible to detect on Earth sounds produced on another planet if you had a dector sensitive enough to very low intensity sounds ?

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6 A Formative Worksheet 3

1. Is the speed of sound faster in air or in water ?

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2. Why do we see lighting before we hear the thunder ?

Watch Video Solution

3. A person on a pier observes a set of incoming waves that have a sinusoidal form with a distance of $1.6m$ between the crests. If a wave laps against the pier every $4s$, what are :

(a) the frequency and

(b) the speed of the waves ?

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4. What types of waves are generated during earthquakes ?

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5. How much longer would it take for sound to travel $1km$ through arctic air at $-50^{\circ}C$ than

to travel $1km$ through desert air at $+50^{\circ}C$?

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6 B Formative Oral Testing

1. Name three characteristics of sound.

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2. What determines the loudness of sound ?

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3. What is an echo ?

Watch Video Solution

4. What is the time interval between the incident sound and the reflected sound for hearing a distinct echo ?

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5. What are infrasonics ?

Watch Video Solution

6. What does the acronym SONAR stand for ?

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7. What is sound board ?

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8. Is the frequency of a musical sound high or low as compared to a noise ?

Watch Video Solution

9. What is treble ?

Watch Video Solution

10. Is intensity of sound subjective or objective in nature ?

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11. (a) A sound wave with a frequency of $15Hz$ is in what region of the sound spectrum ?

(b) For what range of frequency is the hearing most accurate ?

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12. (a) What is the threshold of hearing ?

(b) What is the threshold of pain in the ear ?

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13. (a) To which physical wave property is the pitch related to ?

(b) Which physical property is perceived by the ear as loudness ?

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14. (a) How is riverberation of sound different from an echo ?

(b) Why is a certain amount of reverberation desirable ?

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15. (a) How do Rhinoceroses communicate ?

(b) In which range do dolphins emit sound ?

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6 B Formative Worksheet 1

1. What happens to our hearing abilities as we grow old ?

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2. How can a bat tell the size of a flying insect ?

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3. What type of waves are generated by winds and weather pattens ?

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4. What is the upper limit of ultrasound region ?

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5. What is the difference between the laws of reflection of sound waves and those of light waves ?

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6. Many animals move the ear flap (or pinna) in order to focus their hearing in a certain direction. Can human do so ?

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6 B Formative Worksheet 2

1. What is the full form of the term 'SONAR' ?

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2. What is the meaning of the term 'Navigation' ?

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3. What is the meaning of the term 'Ranging' ?

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4. What is the depth of the submarine ?

Watch Video Solution

5. Can we use SONAR for finding the speed of the submarine, if it were moving underwater ?

Watch Video Solution

6 B Formative Worksheet 3

1. Write the (approximate) range of frequencies of ultrasound.

Watch Video Solution

2. State one important use of 'ultrasound' in industries.

Watch Video Solution

3. State two impotant uses of 'ultrasound' for medical purposes.

Watch Video Solution

4. Explain, in brief, how 'bats' make use of 'ultrasound' in their daily life.

Watch Video Solution

5. Is there any link between the intelligence of dolphins and their ability to 'hear' ultrasound.

Watch Video Solution

6 A Formative Pen Test

1. Mechanical waves can be :

A. longitudinal only

B. transverse only

C. both longitudinal and transverse

D. neither longitudinal nor transverse

Answer:

 Watch Video Solution

2. For propagation of sound waves through a medium, the medium should posses :

A. inertia

B. elasticity

C. both inertia and elasticity

D. rigidity

Answer:

 Watch Video Solution

3. The speed of sound in water approximately :

A. $3 \times 10^8 m/s$

B. $350 m/s$

C. $1500 m/s$

D. $1400 m/s$

Answer: D

Watch Video Solution

4. The speed of sound is largest in :

A. water

B. air

C. steel

D. vacuum

Answer:

Watch Video Solution

5. Sound travels in rocks in the form of :

A. longitudinal elastic waves only

B. transverse elastic waves only

C. both longitudinal and transverse elastic waves

D. non - elastic waves

Answer:

Watch Video Solution

6. Which of the following statements is false :

A. The changes in air temperature have no effect on the speed of sound.

B. The changes in air pressure have no effect on the speed of sound

C. The speed of sound in water is higher than in air

D. Two persons on Moon cannot hear each other.

Answer:

Watch Video Solution

7. How does a bee buzz ?

Watch Video Solution

8. What form of energy do you use to produce sound ?

Watch Video Solution

9. If you hit the table hard, we hear a loud sound. Can you tell why ?

Watch Video Solution

10. How would you infer that sound waves are longitudinal ?

Watch Video Solution

11. Suggest a possible explanation as to why some flying insects produce buzzing sounds and some do not ?

Watch Video Solution

12. A tuning fork vibrates at a frequency of $256 Hz$.

(a) When the air temperature increases, the wavelength of the sound from the tuning fork : (i) increase, (ii) remains the same, (iii)

decrease. Why ?

(b) If the temperature rises from 0° to $20^{\circ} C$, what is the change in wavelength ?

Watch Video Solution

13. A freshwater dolphin sends untrasound sound to locate a prey. If the echo off the prey is received by dolphin $0.12s$ after being send, how far is the prey from the dolphin ?

Watch Video Solution

14. What do you mean by speed of sound ? How is it related to its frequency and wavelength ?

Watch Video Solution

15. "Sound is a from of energy which is emitted by a vibrating source and transmitted through a material medium producing the sensation of hearing". Describe experiment evidences in support of this statement.

Watch Video Solution

6 B Formative Pen Test

1. When a sound wave goes from one medium to another, the quantity that remains unchanged is :

A. speed

B. amplitude

C. frequency

D. wavelength

Answer: C

Watch Video Solution

2. Which of the following is the most important factor which helps in recognising a person from his voice alone ?

A. intensity

B. pitch

C. quality

D. all are equally important.

Answer: C

Watch Video Solution

3. The loudness of sound depends on :

A. wavelength

B. frequencies

C. amplitude

D. speed

Answer: C

Watch Video Solution

4. Pitch of a sound depends on :

A. wavelength

B. amplitude

C. frequency

D. periodicity and regularity

Answer: C

Watch Video Solution

5. Of the following, the one which emits sound of higher pitch is :

A. mosquito

B. man

C. lion

D. woman

Answer: A

Watch Video Solution

6. Wavelength of ultrasonic waves in air is of the order of :

A. $5 \times 10^{-3} m$

B. $5 \times 10^{5} m$

C. $5 \times 10^{4} m$

D. $5 \times 10^{6} m$

Answer: A

Watch Video Solution

7. Will a vibrating source always produce sound ?

Watch Video Solution

8. What is the upper limit of frequency a dog can hear ?

Watch Video Solution

9. Drapery and furniture often improve the acoustics of a room. Explain.

Watch Video Solution

10. An approaching train can be felt by applying ears to rails but through air its approach cannot felt easily Discuss.

Watch Video Solution

11. When we nibble at a rusk, we hear a noise that is simply deafening. But for some reson,

our neighbour makes hardly any noise though he is doing the samed. Why ?

Watch Video Solution

12. (a) If the distance from the point sound source triples, the sound intensity will be : (i) 3 (ii) 1//3 (iii) 1//9. times the original value. Why ? (b) By how much must the distance from the point source be increased to reduce the sound intensity by half ?

Watch Video Solution

13. Medical ultrasound uses a frequency of around $20MHz$ to diagnose human conditions and oilments. (a) If the speed of sound in tissue is $1500m/s$, what is the smallest detectable object ?

(b) If the penetration depth is about 200 wavelengths hoe deep can this instrument penetrate ?

Watch Video Solution

14. (a) After a snowfall, why does it seem particularly quiet ? (b) Why do empty rooms sound hollow ?

Watch Video Solution

15. State the law which governs the reflection of sound waves ? How can this law be experimentally verified ?

Watch Video Solution

Exemplar Multiple Choice

1. Note is a sound :

A. of maxture of serveral frequencies

B. of mixture of two frequencies only

C. of a signal frequency

D. always unpleasant to listen

Answer: C

Watch Video Solution

2. A key of a mechanical piano is struck gently and then struck again but much harder this time. In the second case :

A. sound will be louder but pitch will not be different

B. sound will be louder and pitch will also be higher

C. sound will be louder but pitch will be lower

D. both loudness and pitch will remain unaffected.

Answer: A

3. In SONAR, we use :

A. ultrasound waves

B. infrasonic waves

C. radio waves

D. audible sound waves

Answer: A

Watch Video Solution

4. Sound travels in air if :

A. particles of medium travel from one place to another

B. there is no moisture in the atmosphere

C. disturbance moves

D. both particles as well as disturbance travel from one place to another.

Answer: C

 Watch Video Solution

5. When we change feeble sound to loud we increase its :

A. frequency

B. amplitude

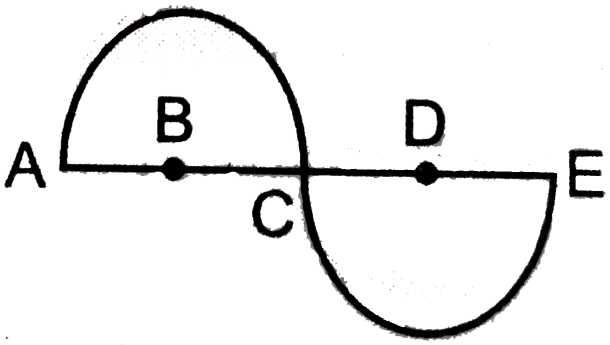
C. velocity

D. wavelength

Answer: B

Watch Video Solution

6. In the curve, half the wavelength is :



A. A B

B. B D

C. D E

D. A E

Answer: B

Watch Video Solution

7. Earthquake produces which kind of sound before the main shock wave begins :

A. ultrasound

B. infrasonic

C. audible sound

D. none of the above

Answer: B

Watch Video Solution

8. Infrasound can be heard by :

A. dog

B. bat

C. rhinoceros

D. human beings

Answer: C

 Watch Video Solution

9. Before playing the orchestra in a musical concert, a sitarist tries to adjust the tension and pluck the string suitably. By doing so, he is adjusting :

A. intensity of sound only

B. amplitude of sound only

C. frequency of the sitar string with the frequency of other musical instruments

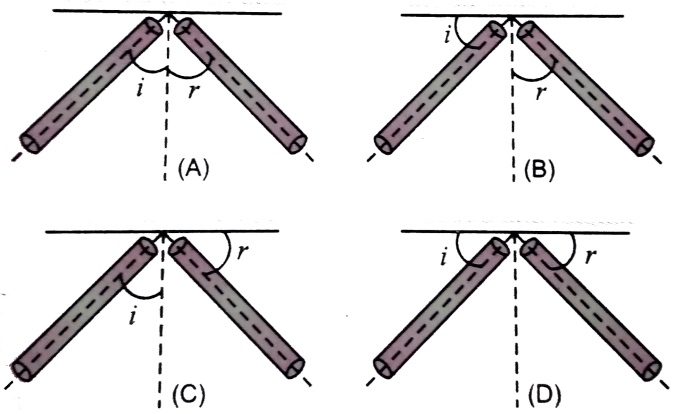
D. loudness of sound.

Answer: C

Watch Video Solution

Assessment Multiple Choice

1. While doing experiment on verifying the laws of reflection of sound, four students measured the angle $< I$ and $< r$. The correct measurement of the angles of incidence and angle of reflections has been done by student :



A. A

B. B

C. C

D. D

Answer: A

Watch Video Solution

2. A laboratory had the folowing apparatus available in it :

(A) Two thin hollow wooden tubes

(B) An intense and board source of sound

(C) An intense pointed source of sound

(D) A sharp pointed detector to detect the sound

(E) A well polished metal sheet

(F) A white painted thermocol sheet

A student can do his experiment to verify the laws of reflection of sound successfully by choosing the appartus labelled as :

A. A, C, D, E

B. A, C, E

C. A, B, D, E

D. A, C and D

Answer: A

Watch Video Solution

3. Four students did their experiments on measuring the speed of a pulse through a string as follows :

Student A stretched his thick cotton string very taut and gave it a very mild transverse horizontal jerk.

Student B stretched his thin jute string just taut and gave it a mild transverse horizontal jerk.

Student C stretched his thick cotton string just taut and gave a strong transverse horizontal jerk.

Student D stretched his thin jute string very taut and gave it a strong transverse horizontal jerk.

The best choice is that of student :

A. A

B. B

C. C

D. D

Answer: C

Watch Video Solution

4. Which of the following statements is incorrect ?

A. Sound travels in straight lines

B. Sound travels as waves

C. Sound as a from of energy

D. Sound waves travel faster in vacuum than in air.

Answer: D

Watch Video Solution

5. Ultrasound waves are those waves :

A. which a man can hear

B. which a man cannot hear

C. which are of high velocity

D. which have high amplitude

Answer: B

Watch Video Solution

6. Which of the following frequencies is audible to human beings ?

A. 5 Hz

B. 27 Hz

C. 5 kHz

D. 50 kHz

Answer: C

 Watch Video Solution

7. An observer standing at the sea coast observes $54 waves$ reaching the coast per minute. If the wavelength of a wave is $10 m$, its speed is :

A. $90m/s$

B. $90cm/s$

C. $9m/s$

D. $900m/s$

Answer: C

Watch Video Solution

8. When a sound wave goes from air into water, the quantity that remains uncharged is its :

A. velocity

B. amplitude

C. frequency

D. wavelength

Answer: C

Watch Video Solution

9. The wavelength of an ultrasonic wave is :

A. the same as that of the audible sound

B. very low

C. more than that of audible sound

D. very high.

Answer: B

Watch Video Solution

10. The frequency of a man's voice is $200Hz$ and its wavelength is $2m$. If the wavelength of a child's voice in $1m$, then the frequency of the child's voice is :

A. 200 Hz

B. 25 Hz

C. 100 Hz

D. 400 Hz

Answer: D

Watch Video Solution

11. A sound of frequency $5Hz$.

A. is of very short wavelength

B. is inaudible

C. moves very slowly

D. is very loud.

Answer: B

Watch Video Solution

12. The distance from crest to crest of any wave is :

A. frequency

B. wavelength

C. speed

D. amplitude.

Answer: B

Watch Video Solution

13. The speed of sound waves having a frequency of $256Hz$ compared with the speed of sound waves having a frequency of $512Hz$ is :

A. half as great

B. the same

C. twice as great

D. four times as great.

Answer: B

Watch Video Solution

14. A sound wave of wavelength $90cm$ in glass is reflected into air. If the speed of sound in

glass is $5400 m / s$, the wavelength of wave in air (speed of sound in air $= 330 m / s$) is :

A. 55 cm

B. 5.5 cm

C. 55 m

D. 5.5 m

Answer: B

Watch Video Solution

15. The distance between two consecutive crests in a wave train produced in a string is $5cm$. If two complete waves pass through a point per second, the speed of the wave is :

A. $10cm/s$

B. $2.5cm/s$

C. $5cm/s$

D. $15m/s$

Answer: A

Watch Video Solution

Watch video solution

16. A boat at anchor is rocked by waves whose crests are $100m$ apart and whose speed is $25m/s$. These waves reach the boat once every :

A. $0.25s$

B. $4.00s$

C. $2500s$

D. $1500s$

Answer: B

Watch Video Solution

17. The waves produced by a motor boat sailing in water are :

A. transverse

B. longitudinal

C. longitudinal and transverse

D. stationary.

Answer: C

Watch Video Solution

18. Which one of the following statement is correct ?

A. A pulse is of long duration

B. A pulse is a sudden disturbance of short duration

C. A pulse is produced by clapping of hands once

D. Mass is transported from one place to the other by a pulse.

Answer: B

Watch Video Solution

19. In a rope or a slinky :

A. both transverse pulse as well as longitudinal pulse can be generated

B. both types of pulses cannot be generated

C. only a transverse pulse can be generated

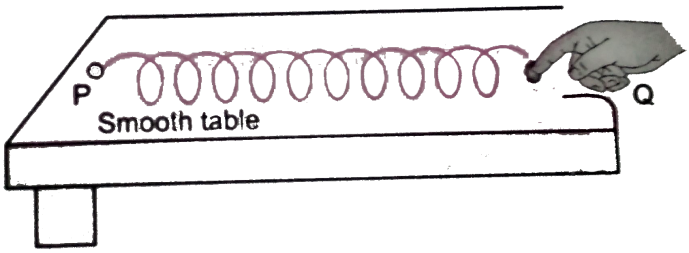
D. only a longitudinal pulse can be generated.

Answer: A

 Watch Video Solution

20. A student sets uo a slinky PQ on a smooth table top in the manner

How can he produce transverse waves in the slinky by moving its free end Q ?



A. at an angle of 45° with the table top

B. backward and forward along the length of the slinky

C. up and down

D. left and right.

Answer: C

Watch Video Solution

Mock Test Sec A

1. What is determined by the wavefrom of a sound wave ?

Watch Video Solution

2. What type of sound is produced by avalanches, meteors, tornados and earthquakes ?

Watch Video Solution

3. "A pigeon takes the insfrasound hearing prize". What is meant by this statement ?

Watch Video Solution

4. Two sounds that differ in frequency are emitted from a single loudspeaker. Which sound will reach your ear first, the one with the lower or the one with higher frequency ?

Watch Video Solution

5. The speed of sound in air on a summer day is $350 m / s$. What is the air temperature ?

Watch Video Solution

6. How far does sound travel in air when a tuning fork of frequency $560Hz$ makes 30 vibrations ? Velocity of sound is $336m/s$?

Watch Video Solution

7. (a) A person listens to a source of sound of frequency $350Hz$ standing at a distance of $500m$. What is the time interval between successive rarefactions from the source ?

(b) What is meant by the term lithotripsy ?

Watch Video Solution

8. (a) When cars begin to move in a long line of stalled traffic, the motion passes through the line as a wave pulse. What is the direction of motion of the pulse ? What is the direction of motion of the pulse relative to the motion of the cars ?

(b) Is the wave affected by the drivers' reaction times ?

Watch Video Solution

9. (a) In a quiet room, put thumbs in your ears firmly and listen. You hear a low pulsating sound. Why ?

(b) Why such low pulsating sounds are not normally heard ?

Watch Video Solution

10. What do you mean by pitch or frequency ? What is difference between them ?

Watch Video Solution

11. Why 'pligging up" and 'popping" of the ears is frequently experienced in ascents and decents on mountain roads or airplanes ?

Watch Video Solution

12. A nerve pulse is a wave pulse that travels along a nerve, typically at a speed of $50 m / s$. If the pulse sweeps past one point in the nerve from t = 0 to t = 2 ms, during what time

interval will it pass a point in the nerve $1m$ away ?

Watch Video Solution

13. Sound propagating through air at $30^{\circ}C$ passes through a vertical cold front into air that is 4°. If the sound has a frequency of $2500Hz$, by what percentage does its wavelength change in crossing the boundary ?

Watch Video Solution

14. The speed of sound in human tissue is of the order of $1500 m/s$. A $3.5 MHz$ probe is used for an ultrasonic procedure.

(a) If the effective physical depth of the ultrasound is 250 wavelengths, what is the physical depth in metres ?

(b) What is the time lapse for the ultrasound to make a round trip if reflected from an object at the effective depth ?

(c) The smallest detail capable of being detected is of the order of one wavelength of the ultrasound. What would this be ?

Watch Video Solution

15. You drop a stone from rest into a well that is $7.35m$ deep. How long does it take before you the splash ?

Watch Video Solution

16. The speed of surface waves in water decreases as the water becomes shallower. Suppose waves travel across the surface of a lake withn a speed of $2m/s$ and a wavelength

of $1.5m$. When these waves move into a shallower part of the lake, their speed decreases to $1.6m/s$, though their frequency remains the same. Find the wavelength of the wave in the shallower water.

Watch Video Solution

17. A long nail has been driven halfway into the side a barn. How should you hit the nail withn a hammer generate a longitudinal wave ? How

should you hit it to generate a transverse wave ?

Watch Video Solution

18. Today our life is richer and fuller of music than it was yesterday, and much of this is due to progress in engineering. What will happen to human feelings when the sea of knowledge spreads further ?

Watch Video Solution

19. Explain briefly the structure of human ear from auditory aspect only.

Watch Video Solution

20. What are multiple echoes ? Give two of their practical applications.

Watch Video Solution

21. (a) Many animals can move the pinna (or ear flap) in order to focus their hearing in a particular direction. What do the humans do for the same purpose ?

(b) What is tinnitus ?

(c) "The hair cells of cochlea are very critical to hearing." Elaborate this statement.

 Watch Video Solution

22. (a) What is the relation between loudness and frequency ?

(b) What is the unit of intensity of sound ?

(c) Derive the relation $v = v\lambda$ where the letters have their usual meanings.

Watch Video Solution

23. (a) A sound wave travelling in a medium is represented .

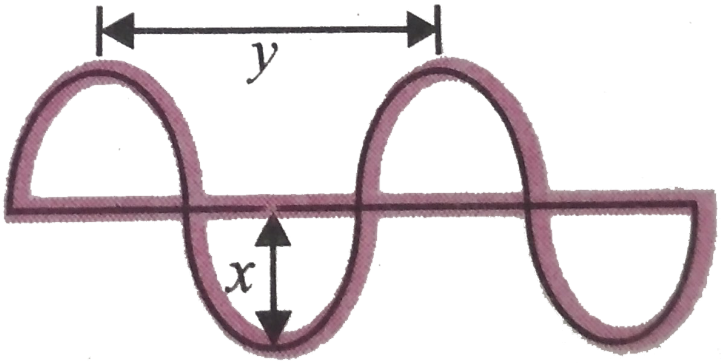
(i) Which letter represents the amplitude of

the wave ?

(ii) Which letter represents the wavelength of the wave ?

(iii) What is the frequency of the source of sound if the vibrating sound makes 360 oscillations in 2 minute ?

(b) Describe an experiment to show the reflection of sound.



Watch Video Solution

24. 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.

Watch Video Solution

Mock Test Sec B

1. The speed of a wave in a certain medium is $960 m / s$. If 3600 waves pass over a certain point of the medium in 1 min, the wavelength is

A. 2 m

B. 8 m

C. 4 m

D. 16 m

Answer: D

Watch Video Solution

2. Of the following properties of a wave, the one that is independent of the others is its :

A. velocity

B. amplitude

C. wavelength

D. frequency

Answer: B

Watch Video Solution

3. Sound will not travel through :

A. a solid

B. a liquid

C. a gas

D. a vacuum

Answer: D

Watch Video Solution

4. The distance between maximum and the next minimum displacement in a wave is $6cm$. The wavelength of the wave is :

A. 6 cm

B. 3 cm

C. 12 cm

D. 24 cm

Answer: C

Watch Video Solution

5. A tuning fork makes 256 vibrations per second in air. When the speed of sound is $330 m / s$, the wavelength of the note emitted is :

A. 0.56 m

B. 0.89 m

C. 1.11 m

D. 1.29 m

Answer: D

Watch Video Solution

6. A sound wave of frequency $500Hz$ cobers a distance of 1000 m in 5 s between the points X and Y. The number of waves between X and Y is :

A. 500

B. 1000

C. 2500

D. 5000

Answer: C

Watch Video Solution

7. The minimum time gap between two sounds to be heard distinctly must be :

A. 0.1 s

B. 0.15 s

C. 0.2 s

D. 1 s

Answer: A

 Watch Video Solution

8. A source of frequency $500Hz$ emits waves of wavelength $0.2m$. How long does it take to travel $300m$?

A. 70 s

B. 60 s

C. 12 s

D. 3 s

Answer: D

Watch Video Solution

9. which of the following frequencies is inaudible to a human being ?

A. 50 Hz

B. 1 kHz

C. 40 kz

D. 15 kHz

Answer: C

Watch Video Solution

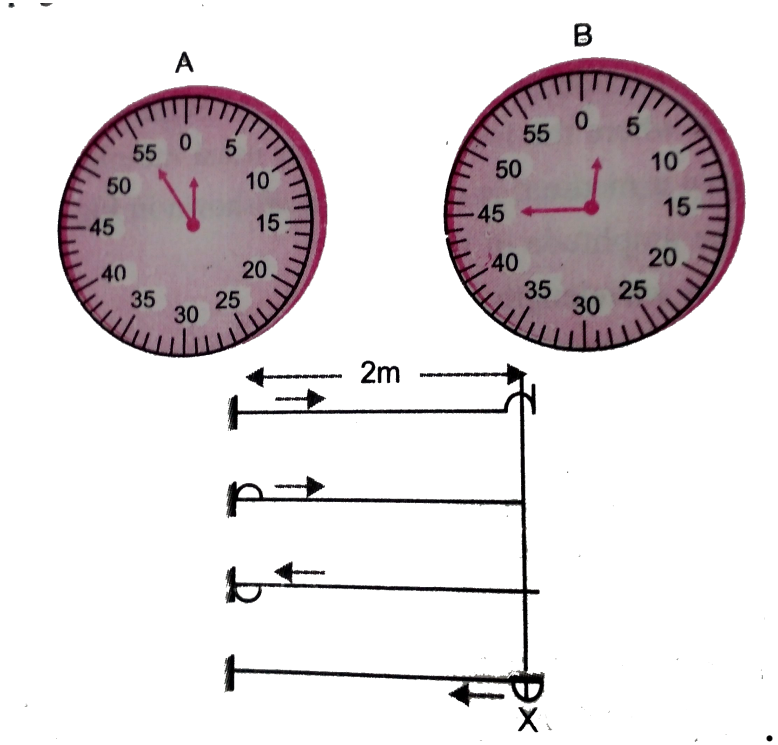
10. A person places his ear at the end of a long steel pipe. He hears two distinct sounds at an interval of $0.5s$ when another person hammers at the other end of the pipe. If the speeds of sounds in metal and air are $3630m/s$ and $330m/s$ respectively, find the distance between the two persons.

Watch Video Solution

11. A strings is stretched and a pulse is created along it. The stopwatch is started from its position A, when the pulse is in position X and is stopped in its position B, when the pulse has travelled back to its position X.

Find the velocity of propagation of the pulse

along the string.



Watch Video Solution

12. While performing an experiment on verifying the laws of reflection of sound (Fig.

6.18), how can the reflected sound be detected better ?

Watch Video Solution

Model Test Sec A

1. Why a fully loaded on sea is to be partly unloaded fro safety before entering a river of fresh water ?

Watch Video Solution

2. A man with a mass of $80kg$ falls $10m$. How much mechanical energy does he gain or lose ?

Watch Video Solution

3. Two cars travel from the bottom to the top of a hill by different routes, one of which has more turns and twists. At the top, which car has more potential energy ?

Watch Video Solution

4. Two bodies are in equilibrium when suspended in water from the arms of a balance.The mass of one body is $28g$ and its density is $5.66g/cm^3$. If the mass of the other body is $36g$, what is its density ?

Watch Video Solution

5. Why does an iron ship float on water ?

Watch Video Solution

6. A wooden sphere of radius $1.0cm$ sinks in water. On coating it with a layer of wax of uniform thickness $3mm$, it just floats. What is the density of wood ? Density of wax $= 0.8g/cm^3$.

Watch Video Solution

7. (a) A satellite goes from a low circular Earth orbit to a higher circular Earth orbit. Does the satellites gravitational potential energy

increase, decrease, or remain the same ?

(b) What is the most common cause of tinnitus (ringing in the ears) ?

Watch Video Solution

8. (a) How can you visualise a power of $1kW$?

(b) Describe the energy changes that take place when you stop your car by using the brakes.

Watch Video Solution

9. (a) How does sound produced by a source reach the listener ?

(b) What is the wavelength of a $5 \times 10^4 Hz$ sound wave pulse emitted by a bat ?

Watch Video Solution

10. "Utrasound cannot be detedted by humans but can be by other animals". Elaborate this statement.

Watch Video Solution

11. (a) What is the function of pinna ?

(b) You observe that the delay between a lighting flash and the thunder is $8s$. How far away is the lightning ?

Watch Video Solution

12. The mass of a block made of certain material is $13.5kg$ and its volume is $15 \times 10^{-3}m^3$. Will the block sink or float in water ? Give a reason for your answer.

Watch Video Solution

13. A body of mass $10g$ floats with $(3/4)th$ of its volume above water. Find its relative density and volume.

Watch Video Solution

14. (a) What is meant by pressure ? How is it related to thrust ?

(b) State Pascal's law.

Watch Video Solution

15. Calculate the work required to be done to stop a car of $1500kg$ moving with a speed of $60km/h$.

Watch Video Solution

16. What is meant by the power of an agent ? How is it related to the force ?

Watch Video Solution

17. What is potential energy ? Give examples of bodies possessing various forms of potential energy.

Watch Video Solution

18. The recent horrific strom surge flooding New Jersey and New york in US by Hurricane Sandy was almost prefectly predicted well in advance, but was more extreme than the average person might expect from a minimal hurricane. There is a metric that quantifies the

energy of a strom based on how far out tropical - strom force winds extend from the centre, known as Integrated Kinetic Energy (IKE).

(i) What is Sandy's ranking in terms of IKE among all the hurricanes witnessed so far ?

(ii) What is the IKE of sandy ?

(iii) How was sandy different from Hurricane Katrina ?

(iv) Which human value did Sandy generate among the people round the globe ?

Watch Video Solution

19. (a) What is the threshold of hearing and what is the treshold of pain in the context of hearing ? How are these related to each other ?

(b) What are the value of intensity level for (i) Soft whisper (ii) Quiet library (iii) Normal conversation (iv) Rock band (with amplifiers) (v) Jet plane take off (vi) Rocket launch ?

Watch Video Solution

20. (a) What are transverse waves ? Give examples.

(b) How can it be demonstrated that sound waves are longitudinal ?

Watch Video Solution

21. State Archimedas' principle. How can it be experimentally verified ?

Watch Video Solution

22. What ids gravitational potential energy ? Obtain an expression for it in case of a body of mass m and at a height h above the Earth's surface.

Watch Video Solution

23. (a) What is kinetic energy due to ? Derive an expression for it in case of a body of mass m moving with velocity v.

(b) If W is the work done to give a speed v to

a car from rest, how much work is done to increase its speed to $2v$?

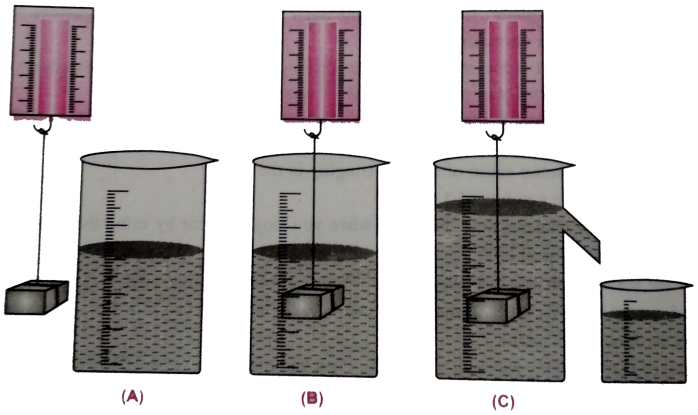
Watch Video Solution

24. Illustrate the law of conservation of energy by discussing the energy changes which occur when we draw a pendulum bob to one side and allow it to oscillate. Why does the bob eventually come to rest ? What happens to its energy eventually ? Is it a violation of the law of conservation of energy ?\

Watch Video Solution

Model Test Sec B

1. The readings of the spring balance will be :



A. equal to each other in all cases

A, B and C.

B. equal to each other in cases A and C only.

C. equal to each other in cases B and C only.

D. different in every case.

Answer:

Watch Video Solution

2. While determining the density of a copper piece using a spring balance and a measuring cylinder, Seema carried out the following procedure :

(i) noted the water level in the measuring cylinder without the copper piece.

(ii) immersed the copper piece in the water.

(iii) noted the water level in the measuring cylinder with the copper piece inside it.

(iv) removed the copper piece from the water and immediately weighed it using a spring balance. The wrong step in the proceedure is :

A. step (i)

B. step (ii)

C. step (iii)

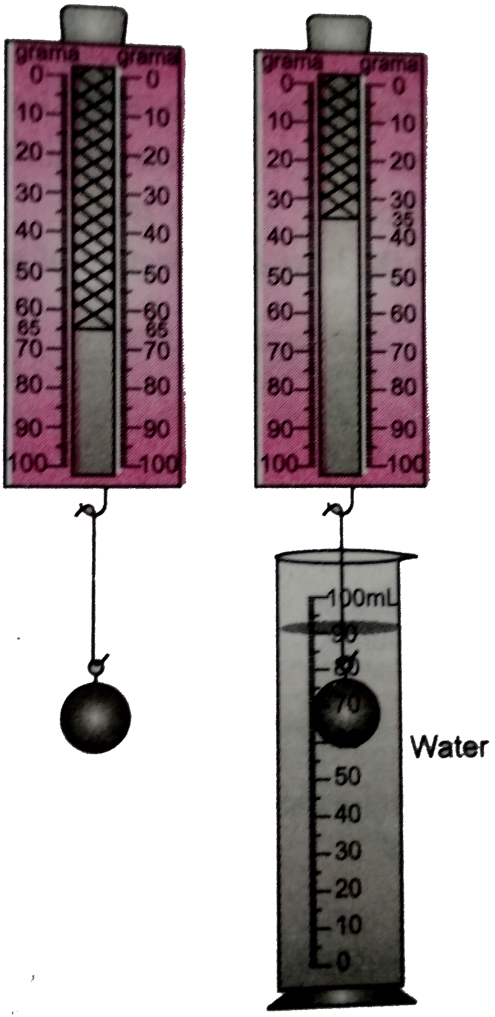
D. step (iv)

Answer:

Watch Video Solution

3. A student notes down the observations in the two spring balances and the measuring

cylinder.



A. 64 cc

B. 36 cc

C. 30 cc

D. 100 cc

Answer: C

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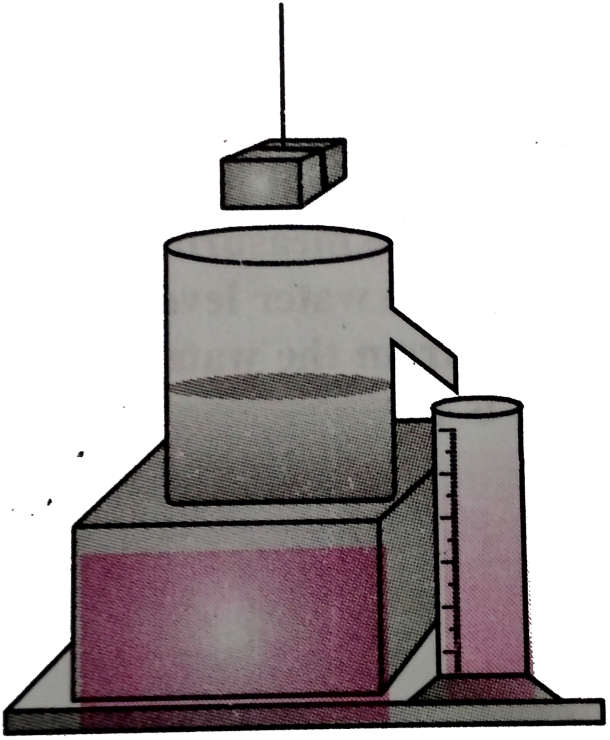
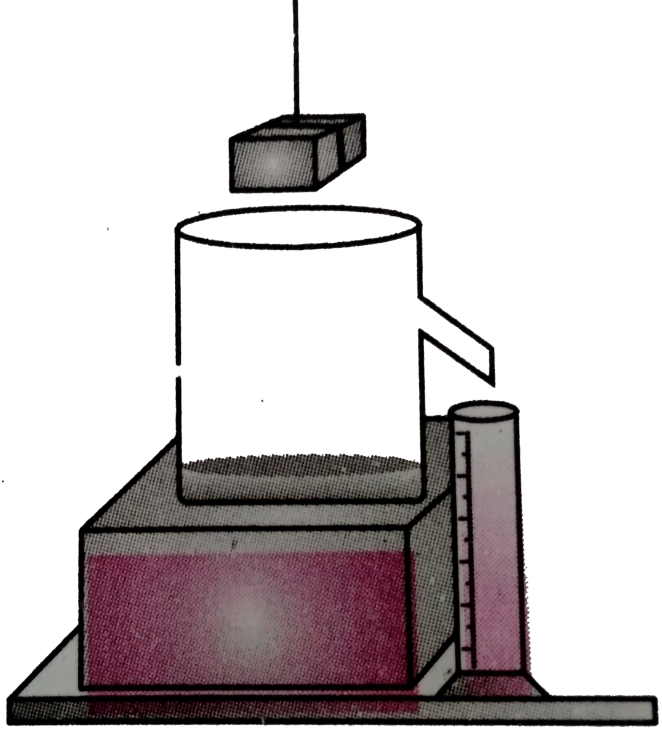
4. Three students A, B and C determined the volume of a solid by immersing it in water in the overflow cans set up The result obtained will be wrong for :

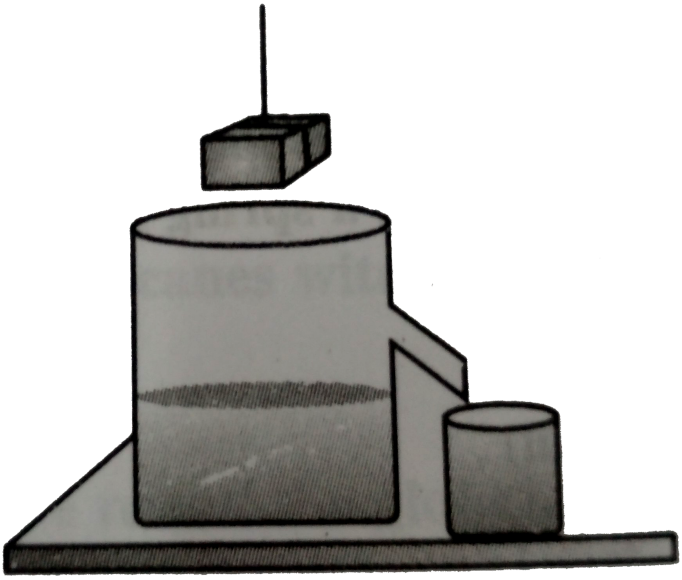


(A)

(A) ,



(B) ,



(C)

(C) .

A. student A

B. student B

C. student C

D. all three students.

Answer:

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5. A piece of wood is held under water. The upthrust on it will be :

A. equal to the weight of the wood piece

B. less than the weight of the wood piece

C. more than the weight of the wood piece

D. zero

Answer:

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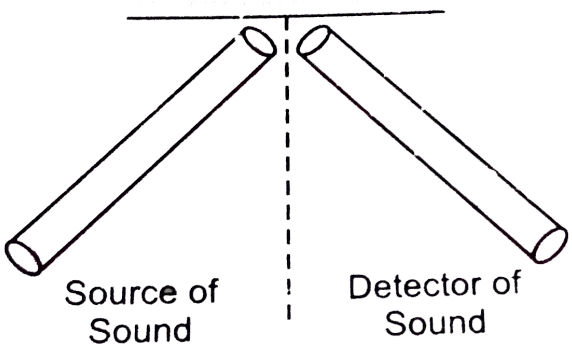
6. For doing his experiment on verifying the laws of reflection of sound, a student sets up his apparatus .

The experiment is more likely to get performed successfully if the screen shows is a

:



A. plane wooden board

B. wooden board with many holes in it

C. a foam padded board

D. a sheet of pure white cloth

Answer:

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7. While doing the experiment on measuring the velocity of a pulse through a stretched string, a student had to choose between a

(i) thick silk string and a thick cotton string

(ii) stop clock and a table clock.

The combination choice that he should prefer is :

A. silk string and the table clock

B. silk string and the stop clock

C. cotton string and the table clock

D. cotton string and the stop clock.

Answer:

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8. A weightless rubber balloon has 100 gram of water in it. Its weight in water will be:

A. 100 g

B. 200 g

C. 50 g

D. zero

Answer: D

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9. The bells of a college or a temple are made of large size. It is for :

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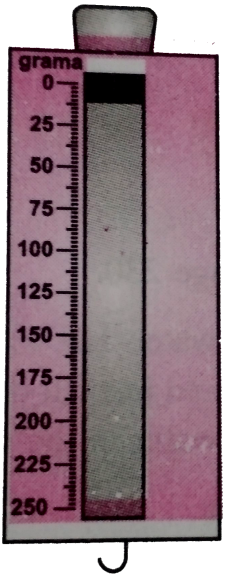
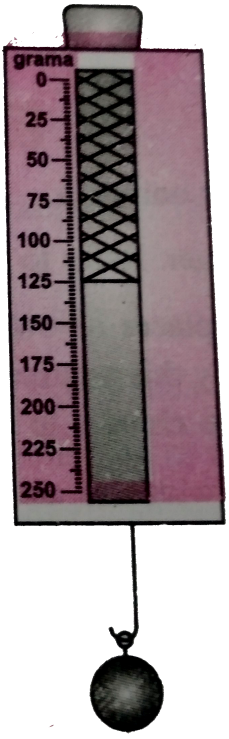
10. The spring balance is used to measure the mass of the given sphere. What is the mass of the sphere ?





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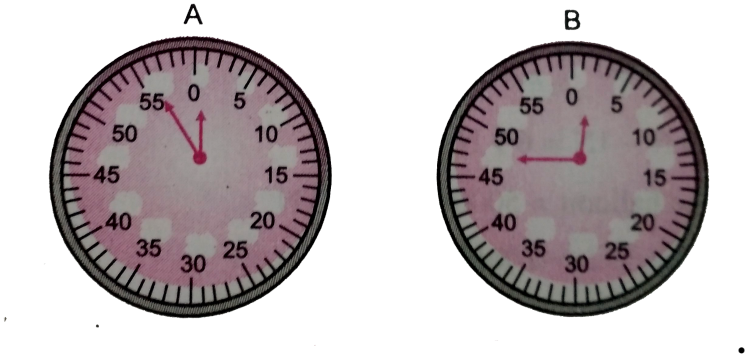
11. A strong transverse horizontal pulse, created at one end of a string, is observed to complete 5 single journeys (from one end to other end) along its length, before fading out. The initial and final readings, on a stop clock used in the experiment, are as shown in (Fig. MT 2.6).

If the length of the string is L metre, find the

speed of the pulse through the string.



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12. The intensity of a sound wave gets reduced by 20% on passing through a slab. The reduction intensity on passage through two such consecutive slabs

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