



PHYSICS

BOOKS - KUMAR PRAKASHAN KENDRA

PHYSICS (GUJRATI ENGLISH)

SOUND

Activity 12 1

1. Take a tuning fork and set it vibrating by triking its prong on a rubber pad.Bring it near

your ear.

Do you hear any sound?



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2. Take a tuning fork and set it vibrating by striking its prong on a rubber pad. Bring it near your ear.

Do you hear any sound?



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3. Take a tuning fork and set it vibrating by striking its prong on a rubber pad. Bring it near your ear.

Do you hear any sound?



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Activity 12 2

1. *mho* is the unit of

A. specific resistance

B. conductivity

C. resistance

D. capacitor

Answer:



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Activity 12 4

1. Take a slinky as shown below.

Ask a friend to hold one of its ends. You hold

the other end and move away from your friend. Now you release the slinky.



A slinky

What happened?



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Intext Questions And Answers

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 sound has a higher pitch:
guitar or 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 Hz and speed is 440 m s^{-1} in a given medium.



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10. 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 front 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 returned in 3 s. What is the distance of the reflecting surface from the source, given that the speed of sound is 342 m s^{-1} .



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14. Why are the ceilings of concert halls curved ?



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



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16. What is the range of frequencies associated with (a) infrasound (b) ultrasound ?



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17. A submarine emits a sonar pulse, which returns from an underwater cliff in 1.02 s. If the speed of sound in salt water is 1531 m s^{-1} ? how far away is the cliff?



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Questions And Answers Answer The Following Questions In Very Short

1. What is vibration ?



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2. What is a wave ?



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3. What is sound ?



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4. How does the sound produced by a vibrating object in a medium reach your car?



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5. How does the sound produced by a vibrating object in a medium reach your car?



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6. Define: 1. Compression 2. Rarefaction



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7. What is called a longitudinal wave ?



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8. What is called a transverse wave ?



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



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10. Give one example each of longitudinal wave and transverse wave.



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11. What is the frequency (ν) of the wave with time period 0.05s ?



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12. What is the quality (timber) of sound?



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13. What is a rich quality of sound ?

- A. a note of high frequency
- B. many harmonics
- C. a note of high amplitude
- D. only few fundamental frequency

Answer:



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14. Which of the following is a good conductor of electricity?

A. Charcoal

B. Coke

C. Graphite

D. Diamond

Answer:



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15. A myopic eye can be corrected by using a

A. Plano convex lens

B. Cylindrical lens

C. Concave lens

D. Convex lens

Answer:



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16. What is the relation between frequency, wavelength and the speed of a wave ?



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17. The time period of a sound wave having wavelength 0.69 m in medium is 0.002 s. Find the speed of the sound in that medium.



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18. A hypermetropic eye can be corrected by using a

A. Plano convex lens

B. Cylindrical lens

C. Concave lens

D. Convex lens

Answer:



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19. When the matter is cooled to very low temperature, it will form

A. semi conductor

B. capacitor

C. super conductor

D. insulator

Answer:



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20. How is the speed of sound affected by temperature ?



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21. How is the speed of sound affected by the change in medium ?



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22. What is the intensity of sound?



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23. The most efficient engine is

A. steam

B. electric

C. petrol

D. diesel

Answer:



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24. What is reverberation ?



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25. How can reverberation be reduced ?



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26. What is an echo?



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27. A human heart beats 72 times in a minute.

What is its frequency?



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28. Why do we hear the whistle of an approaching train before the train reaches us?



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29. What is the full form of SONAR?



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30. Or which type are earthquake waves before the main shock begins?



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Questions And Answers Choose The Correct Option From Those Given Below Each Question

1. What is the type of sound wave propagating

A. Longitudinal only

B. Transverse only

C. It can be either longitudinal or transverse

D. Non-mechanical

Answer:



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2. Which waves don't need a medium for propagation?

A. Sound waves

B. Light waves

C. Earthquake waves

D. Waves on water surface

Answer:



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3. Or which type are earthquake waves before the main shock begins?

A. Infrasonic

B. Ultrasonic

C. Supersonic

D. Intrasonic

Answer:



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4. What is the full form of SONAR?

A. System of Navigation And Research

B. SOund NAvigation and Ranging

C. SOund of Natural Agriculture Research

D. SOund of NAvigation and Research

Answer:



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5. What is the range of wavelength in air of audible sound waves ? (When sound velocity in air is 340 ms^{-1} .)

A. 0.17 m to 170 m

B. 0.17m to 17 m

C. 0.017 m to 17m

D. 0.017 m to 17 m

Answer:



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6. Sound of which frequency from the following is ultrasonic sound?

A. 30 Hz

B. 300 Hz

C. 3000 Hz

D. 30,000 Hz

Answer:



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7. When is echo heard?

A. If the time interval between original sound and reflected sound must be

atleast 0.1s.

B.If the time interval between original sound and reflected sound is less than 0.1 s.

C.If the time interval between original sound and reflected sound is less than 0.01 s.

D.If the time interval between original sound and reflected sound is only 0.01 s.

Answer:



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8. Which of the following relations is true for sound waves?

A. $\lambda \propto v^2$

B. $v = \lambda v$

C. $\lambda \propto \frac{1}{v}$

D. $\lambda \propto \frac{1}{v^2}$

Answer:



9. Which of the following formula is true showing the relation between wavelength, frequency and wave velocity?

A. $\lambda = \frac{v}{T}$

B. $v = \lambda v$

C. $v = \frac{\lambda}{v}$

D. $\lambda = uv$

Answer:





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10. What is the phase difference between consecutive crest and trough ?

A. $\lambda/4$

B. $\lambda/2$

C. λ

D. 2λ

Answer:



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11. The distance between two consecutive condensations in the sound wave propagating in air is 0.85 m . If the velocity of the sound in air is 340 m s^{-1} , what would be the frequency of this wave?

A. 680 Hz

B. 340 Hz

C. 170 Hz

D. 85 Hz

Answer:



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12. In the air, the velocity of sound wave is 340 m s^{-1} and wavelength is 3.4 m . Now a wave of the same frequency propagates in water, then what would be its wavelength ? (Take velocity of wave in water as 1500 m s^{-1} .)

A. 15 m

B. 34 m

C. 3.4 m

D. 1.5 m

Answer:



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13. Waves of light are

A. non-mechanical and longitudinal waves

B. mechanical and longitudinal waves

C. non-mechanical and transverse waves

D. mechanical and transverse waves

Answer:



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14. On which of the following factors does the velocity of wave not depend?

A. Temperature of the medium

B. Elasticity of the medium

C. Intertia of the medium

D. Amplitude of the wave

Answer:



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15. The wavelength of the wave produced on the surface of water is 2 cm. If the wave velocity is 16 ms^{-1} . how many waves are produced in 1s from the source ?

A. 800

B. 1600

C. 400

D. 8

Answer:



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16. Two waves produced from a source are shown in the following figure. State the wavelength and amplitude of the wave.



A. 25 cm, 4 cm

B. 5 cm, 4 cm

C. 20 cm, 5 cm

D. 20 cm, 4 cm

Answer:



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17. Wave of which of the following frequencies could we hear?

A. 0.15 Hz

B. 15 Hz

C. 150 Hz

D. 25 kHz

Answer:



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18. What is the frequency range of audible sound wave?

- A. From 2 Hz to 20 Hz
- B. From 20 Hz to 20 kHz
- C. From 2 kHz to 20 kHz
- D. From 20 Hz to 200 Hz

Answer:



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19. Which type of sound waves does the bat produce?

A. Ultrasonic sound waves

B. Infrasonic sound waves

C. Audible sound waves

D. All types of sound

Answer:



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20. Who can experience ultrasonic sound?

A. Man (Human being)

B. Whale

C. Elephant

D. Rat

Answer:



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21. Which waves are used in ECG technique?

A. Ultrasonic waves

B. Infrasonic waves

C. Supersonic waves

D. Audible waves

Answer:



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22. Whose unit is decibel (dB)?

A. Intensity of sound

B. Frequency of sound

C. Loudness of sound

D. Absorptivity of sound

Answer:



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23. The SI unit of intensity of sound is

A. Wm^{-2}

B. W^2m^{-1}

C. m^2W^{-1}

D. $(Wm^1)^2$

Answer:



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24. Note is a sound which is

- A. a mixture of several frequencies
- B. a mixture of only two frequencies
- C. of only single frequency
- D. not pleasant to hear always

Answer:



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25. The key of the mechanical piano is pressed (struck) first lightly and then with force, in second case ..

A. sound would be loud but pitch would be same as earlier

B. sound would be loud and pitch would be higher

C. sound would be loud but pitch would be lower

D. there would be no effect on both the loudness and pitch of the sound

Answer:



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26. In SONAR waves are used.

A. ultrasonic sound

B. Infrasonic sound

C. radio

D. audible sound

Answer:



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27. When sound waves propagate in air.....

A. particles of medium travel from one place to another

B. there is no moisture in atmosphere

C. disturbance moves in air

D. both particles as well as disturbance
travel

Answer:



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28. When we convert soft sound in to loud sound, we increase its

A. Frequency

B. amplitude

C. velocity

D. wavelength

Answer:



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29. can hear Infrasonic sound.

A. Dog

B. Bat

C. Rhinoceros

D. Man

Answer:



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30. In the beginning of music programme, the sitarist changes / adjusts the tension in the string of the sitar. Thus by changing/adjusting the tension of the string, he

A. changes / adjusts the intensity of the sound

B. changes / adjusts the amplitude of the sound

C. tunes the frequency of string of sitar with frequency of other instrument

D. changes / adjust the loudness of the sound

Answer:



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Questions And Answers Fill In The Blanks

1. The time taken for one complete oscillation
In the medium is called its



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2. The SI unit of the frequency of the wave is.....



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3. waves propagate through crest and trough.



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4. The wavelength is represented by
(Greek letter)



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5. The product of wavelength and frequency of the wave is called.....



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6. $1\text{\AA} = \dots\dots\dots \text{m}$



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7. If the frequency of a sound wave of wavelength 34 m is 10 Hz in air, then the speed

of the sound wave in air is ms^{-1}



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8. A boy claps his hands near a straight-high hill and heard the echo after 5 second. If velocity of sound in air is 340 m/s the distance between the boy and the hill is metre



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9. The three tiny bones present in middle ear are called ear ossicles. Write them in correct sequence beginning from ear drum.



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Questions And Answers Fill In The Blanks By Selecting The Correct Alternative From Those Given In The Bracket

1. Maximum displacement of a vibrating body on either side of its equilibrium position is

called the of the vibrating body

(velocity, time period, amplitude)



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2. If a vibrating body completes 50 vibrations in 1s, then its time period is

(0.05, 0,02, 0.5)



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3. Waves which require a medium for propagation are called waves.

(mechanical, non-mechanical, transverse)



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4. waves are transverse waves.

(Light, Sound, Mechanical)



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5. waves are non-mechanical waves.

(Light, Sound, Water surface)



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6. Sound waves cannot propagate through

(glass, water, vacuum)



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7. In waves particles of the medium oscillate in perpendicular direction of the Propagation

(longitudinal,transverse ,sound)



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8. Sound waves of frequencies below 20 Hz are called sound waves.

(Infrasonic, ultrasonic, audible)



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9. Whale can detect... sound waves.

(audible, ultrasonic, infrasonic)



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10. For hearing distinct echo, the minimum distance of the obstacle from the source of sound should be m.

(10.2, 34.4, 17.2)



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11. The outer of sun is called

(1 thermosphere, 2 exosphere, 3 photosphere 4 stratosphere)



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12. The echo is heard of the time interval between the original sound and reflected one is..

(at least 0.1 second, less than 0.1 second, more than 0.2 second)





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13. The loudness of the sound is dependent on
... (amplitude, velocity, wavelength)



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14. The level of noise is measured in unit
(dB, Wm^{-2} A)



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Questions And Answers State Whether The Following Statements Are True Or False

1. The motion of disturbance in the medium is called a wave.



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2. The velocity of the sound in vacuum is 344 m.s^{-1}



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3. Sound propagates in air through compression- rarefaction.explain



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4. Light waves are... And



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5. The speed of sound waves is more in water than that in atr.



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6. We (Human being) cannot hear Infrasonic sound.



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7. Or which type are earthquake waves before the main shock begins?



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8. The echo is heard of the time interval between the original sound and reflected one is..

(at least 0.1 second, less than 0.1 second, more than 0.2 second)



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9. There are three bones -hammer anvil and stirrup in the inner ear.



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10. The ----- in the inner ear turns pressure variation into electrical signals. 1) Tympanic membrane 2) Stirrup 3) Hammer 4) Cochlea



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11. Wave velocity is the velocity of oscillation of particles of medium.



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12. Bat can produce ultrasonic sound.



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13. Rhinoceroses can produce the sound of frequency as low as 5 Hz.



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14. Rats play games by producing ultrasound



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15. Pitch of the sound means frequency of the sound and loudness of the sound means amplitude.



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Questions And Answers Answer The Following Questions Is Short

1. Why is sound wave called a longitudinal wave?



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2. The following figure shows a wave form of frequency 50 Hz:



(i) amplitude (ii) Wavelength (iii) velocity (iv) time period



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



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4. What is loudness of sound? On what factors does it depend?



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5. A boy heard a sound of frequency 100 Hz at a distance of 500 m from the source of the sound. What is the time period of oscillating particles of the medium ?



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6. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen. Why?



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7. Two children are at opposite ends of an aluminium rod. One strikes the end of the rod with a stone. Find the ratio of time taken by the sound waves in air and in aluminium to reach the second child. Take velocity of sound in aluminium equal to 6420 ms^{-1} and velocity of sound in air as 346 ms^{-1} .)



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



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9. 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 remains the same, Do you hear echo of sound on a hotter day?



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



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11. A man fires a rifle in front of a cliff and hears the echo after 3 second. Calculate the distance of the man from the cliff, if the velocity of sound in air is 340 m s^{-1}



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12. Why is echo not heard in a small room?



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13. A person has a hearing range from 20 Hz to 20 kHz. What are the typical wavelength of sound waves in air corresponding to these two frequencies? Take the speed of sound in air as 344 m s^{-1}



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



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15. How is ultrasound used for cleaning?



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16. A sound wave travels at a speed of 339 m s^{-1} . If its wavelength is 1.5 cm, what is the

frequency of the wave? Will it be audible?



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17. 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 3625 m.



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18. A ship which is stationary is at a distance of 2800 m from the seabed. The ship sends an ultrasound signal to the seabed and its echo is heard after 4 s. Find the speed of sound in sea water,



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19. Cracks in bones can be detected using



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20. Draw a neat and cleaned diagram of human ear and label the auditory parts



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21. Draw graphical representation of the wave shaper for (1) low-pitched sound and (2) high-pitched sound.



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22. When the wire of a guitar is plucked, .

What types of waves are produced in (i) wire
(ii) air?



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Questions And Answers Give Scientific Reason For The Following Statements

1. Explain propagation of sound waves in air.



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2. Why are sound waves called mechanical waves?



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3. Sound produced by honeybees can be heard but sound produced by the oscillating pendulum cannot be heard



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4. A string vibrates in 7 segments to a frequency of 210 Hz. The frequency that will cause it to vibrate in 3 segments will be



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5. The bat can fly in the dark without colliding with any obstacle.



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Questions And Answers Match The Following Property

1. Air is filled in vehicle tyres because

- A. it has low density
- B. it is cheap
- C. it is highly compressible
- D. it is non-conducting

Answer:



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2. The focal length of the lens in a photographic camera is 5cm. what is the power of the lens?



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3. Give one example each of longitudinal wave and transverse wave.



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4. Audible sound and Infrasonic sound



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Questions And Answers Distinguish Between The Following

1. Mechanical waves and non-mechanical waves



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Questions And Answers Answer The Following Questions In Brief

1. With the help of a diagram describe how compression and rarefaction pulses are produced in air near a source of sound. (AS_5)



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2. The average body temperature of a house cat is $101.5\text{ }^{\circ}\text{F}$. What is this temperature in Celsius?



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3. 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 $g = 10 \text{ m s}^{-1}$ and speed of sound = 340 m s^{-1} .



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4. Why is echo not heard in a small room?



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5. A boy watches Dussehra celebrations from a distance and sees the effigy of Ravana burn into flames and hears an explosion after 2 second. How far was he from the effigy, if the speed of sound in air was 335 ms^{-1} ?



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6. Dry ice, or frozen carbon dioxide sublimates (phase change between solid to gas) at $-78.5 \text{ }^\circ\text{C}$ under normal atmospheric pressures. What is this temperature in Fahrenheit?



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7. Give three medical uses of ultrasound



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8. Liquid oxygen boils at normal pressure at $-182.96\text{ }^{\circ}\text{C}$. What is this temperature in Kelvin?



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9. Find Where Fahrenheit and Celsius Are Equal?



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10. What Temperature Are Fahrenheit and Kelvin Equal?



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11. A construction worker's helmet slip and falls when he is 78.4 m above the ground .He hear the sound of the helmet heating the ground 4.23 second after it slipped Find the speed of sound .($g=9.8 \text{ m s}^2$)



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12. In many ideal gas problems, room temperature is 300 K to make calculations easier. What is this temperature in Celsius?





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Questions And Answers Answer The Following Questions In Detail

1. The temperature of an object is 80 degrees Fahrenheit. Find out this figure on the Celsius scale?



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2. What is reflection of light ? Explain laws of reflection



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3. (a) Distinguish between music and noise.
(Mention three points.) (b) Name three animals who use ultrasound for navigation and location.



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4. Convert 86°F to the Celsius scale.



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5. Convert 104°F to the Celsius scale.



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**Questions And Answers Solve The Following
Numericals Textual Examples Numericals**

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



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2. A person clapped his hands near a cliff and heard the echo after 5 s. What is the distance of the cliff from the person if the speed of the sound is taken as 346 ms^{-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 ultrasound through sea water is 1531 m s^{-1} what is the distance of the seabed from the ship?



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Questions And Answers Additional Numericals
For Practice

1. Calculate the frequency of an oscillator having periodic-time 0.01 s



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2. If an oscillator performs 50 oscillations in 1s. find out the periodic time of this oscillator.



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3. If periodic time of a sound wave having wavelength 0.24 m in a medium is 2×10^{-3} s. find out the velocity of the sound wave in that medium.



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4. If frequency of a sound wave in air having wavelength 34 m is 10 Hz, find out the velocity of that sound wave in air



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5. If velocity of a sound wave having wavelength 0.17 cm is 340 ms. then can human ear hear this sound?



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6. A stationary (steady) ship transmits ultrasonic sound, that returns from the seabed, after the transmission it is received after 4s. If velocity of the ultrasonic sound in

the sea is 1531 m.s^{-1} then what is the distance of the seabed from the ship?



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7. How much time is required for a sound wave having frequency 2 kHz and wavelength 100 cm, to cover a distance of 2 km?



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8. The frequency of the sound wave having velocity 340 m s^{-1} is 5 kHz. Find out the wavelength of this sound wave in air.



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9. Human ear can hear the sound wave having frequency from 20 Hz to 20,000 Hz. Find out the minimum and maximum audible frequency limit in context of the wavelength for sound

wave propagating in water. Velocity of sound wave in water is 1500 m s^{-1}



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10. A source of transverse wave produces 40 crests and 40 troughs in 0.4s. Find the frequency of this transverse wave.



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11. If the velocity of sound in aluminium is 5100 m s^{-1} find out wavelength of sound wave having frequency 255 Hz in aluminium.



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12. The distance between two consecutive crests of waves of water colliding with a boat tied to an anchor is 100 m . If velocity of wave is 20 m s^{-1} then after how much time would

Wave collide with the boat? What would the frequency of wave colliding with the boat?



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13. write 3 equations of rotational motion. Explain it



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14. A girl is sitting in the centre of a garden of dimensions $12\text{m} \times 12\text{m}$. There is a house on

the left side adjacent to the garden and a road to right side. A fire-cracker burst on the road, would the girl hear echo?



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15. The thunder sound is heard on the earth after $10\frac{8}{10}$ of the flash of lightning, then find the approximate distance of the thundering cloud from the earth. Take speed of sound 340 m s^{-1}



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16. The speed of sound in air is 340 m s^{-1} (1)

find the wavelength of the frequency is 256 Hz.

(2) Find the frequency of the wavelength is

0.85 m



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