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ACADEMY OF EXCELLENCE

Chapter – 12 Sound

Multiple Choice Questions

Q1. Note is a sound

a) **Of mixture of several frequencies**
b) **Of mixtures of two frequencies only**
c) **Of a single frequency**
d) **Always unpleasant to listen**

Answer: Option a) Of mixture of several frequencies

The sound is produced of different mixture of several frequencies is called a note.

Q2. A key of mechanical piano 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: Option c) Sound will be louder but pitch will be lower

The sound is louder but pitch is lower since the pitch of sound depends on frequency.

Q3. In SONAR, we use

a) **Ultrasonic waves**
b) **Infrasonic waves**
c) **Radio waves**
d) **Audible sound waves**

Answer: Option a) Ultrasonic waves

SONAR is a machine that uses ultrasonic waves to measure the distance and speed of underwater objects.

Q4. 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: Option c) Disturbance moves

Sound will travel in air when disturbance moves. In the propagation of sound waves, the particles vibrate in its own position. The disturbance is due to vibration of particle from one place to another.

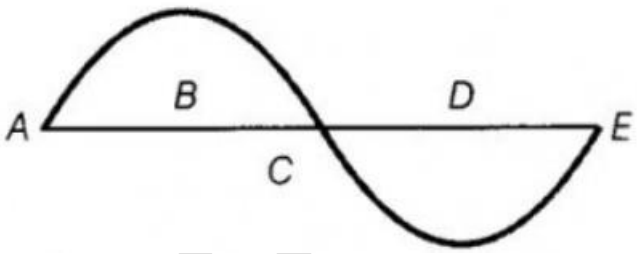
Q5. When we change feeble sound to loud sound, we increase its

a) **Frequency**
b) **Amplitude**
c) **Velocity**
d) **Wavelength**

Answer: Option b) Amplitude

Amplitude of a sound defines its loudness or softness. So, for a loud sound it has a higher amplitude.

Q6. In the given curve, half the wavelength is



a) **AB**
b) **BD**
c) **DE**
d) **AE**

Answer: Option b) BD

The half wavelength is BD, because BD is the half the length of one complete cycle.

Q7. Earthquake produces which kind of sound before the main shock wave begins

a) **Ultrasound**
b) **Infrasound**
c) **Audible sound**
d) **None of these**

Answer: Option b) Infrasound

Low frequency infrasound 5 Hz is produced by earthquake before the main shock wave begin which alert the animals.

Q8. Infrasound can be heard by

a) **Dog**

b) **Bat**
c) **Rhinoceroses**
d) **Human being**

Answer: Option c) Rhinoceroses

The frequencies less than 20 Hz are infrasound. Rhinoceroses communicate infrasound of frequency as low as 5 Hz.

Q9. 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

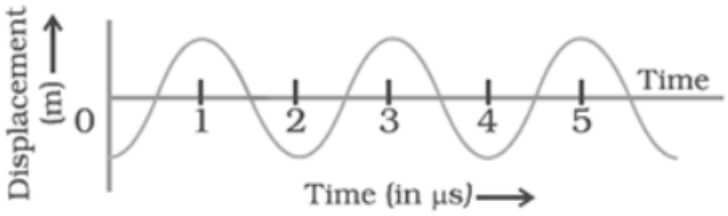
a) **Intensity of sound only.**
b) **Amplitude of sound only.**
c) **Frequency of the string with the frequency of other musical instruments.**
d) **Loudness of sounds.**

Answer: Option **c) Frequency of the string with the frequency of other musical instruments.**

Sitarist adjusts frequency of the star string with the frequency of other musical devices as sound is pleasant to listen.

Short Answer Type Questions

Q10. The given graph shows the displacement versus time relation for a disturbance travelling with velocity of $1500\ ms^{-1}$. Calculate the wavelength of the disturbance.



Answer:

Velocity (v) $= 1500\ ms^{-1}$

Time taken for one complete cycle $= 2\ \mu s$

$1\ \mu s = 10^{-6}\ s$

time $t = 2\ \mu s = 2 \times 10^{-6}\ s$

$$v = f\lambda$$

So,

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

$$\lambda = vT$$

$\lambda = wavelength$

$f = frequency$

$T = time\ period$

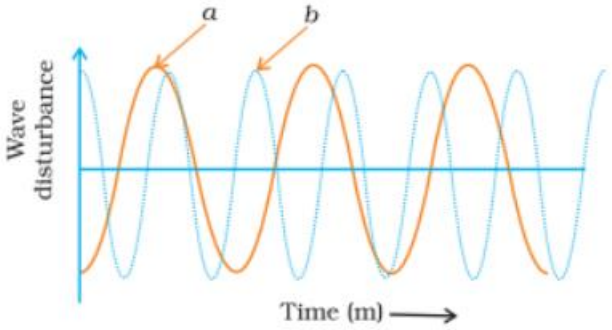
$$\lambda = 1500 \times 2 \times 10^{-6}$$

$$\lambda = 3000 \times 10^{-6}$$

$$\lambda = 3 \times 10^{+3} \times 10^{-6}$$

$$\lambda = 3 \times 10^{-3}\ m$$

Q11. Which of the two graphs (a) and (b) representing the human voice is likely to be the male voice? Give reason for your answer.



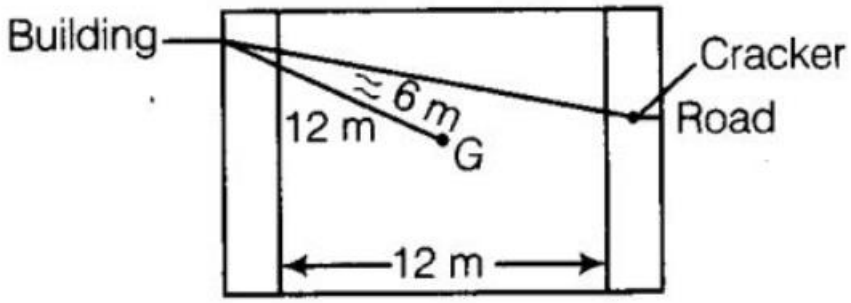
Answer:

Graph (a) is the male voice. As the pitch and frequency of male voice is lower than female voice and vibration of graph (b) is higher frequency and higher pitch.

Q12. A girl is sitting in the middle of a park of dimension $12\ m \times 12\ m$. 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 o the road by a cracker. Is it possible for the girl to hear the echo of this sound? Explain your answer.

Answer:

No, it's not possible for a girl to hear the echo of this sound as distance between the girl and building, is $6\ m$ but the echo is heard, if the minimum distance between the observer and the obstacle is 11.3 m



Q13. Why do we hear the sound produced by the humming bees while the sound of vibrations of pendulum is not heard?

Answer:

The frequency of vibrations of pendulum equal to 20 Hz i.e., infrasound. We cannot hear infrasound but humming sound is heard by human beings.

Q14. If any explosion takes place at the bottom of a lake, what type of shock waves in water will take place?

Answer:

Infrasound shock waves in water take place, when explosion is at the bottom of a lake.

Q15. Sound produced by a thunderstorm is heard 10 s after the lightning is seen. Calculate the approximate distance of the thunder cloud (Given, speed of sound $= 340\ ms^{-1}$).

Answer:

Time $(t) = 10\ s$

Speed $(v) = 340\ m/s$

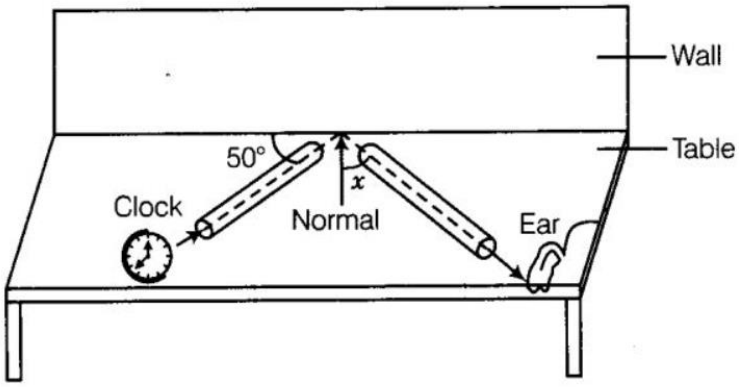
$$distance = speed \times time$$

$$= 340 \times 10 = 3400\ m$$

$$= \frac{3400}{1000}\ km = 3.4\ km$$

The distance of thunder cloud = 3.4 km

Q16. For hearing the loudest ticking sound heard by the ear, find the angle x in the figure.



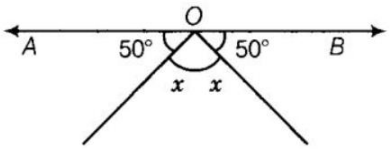
Answer:

In law of reflection, the angle of incidence (x) is equal to the angle of reflection x.

AOB is a straight line

$$\angle AOB = 180^o$$

$$50^o + x + x + 50^o = 180^o$$



sum of angles lies on the same side of a line is 180^o.

$$2x + 100^o = 180^o$$

$$2x = 180^o - 100^o$$

$$2x = 80^o$$

$$x = \frac{80^o}{2}$$

$$x = 40^o$$

Q17. Why is the ceiling and wall behind the stage of good conference halls or concert halls made curved?

Answer:

After reflection the sound reaches to corners of the hall uniformly so the ceiling of concert, conference and cinema halls are made curved.

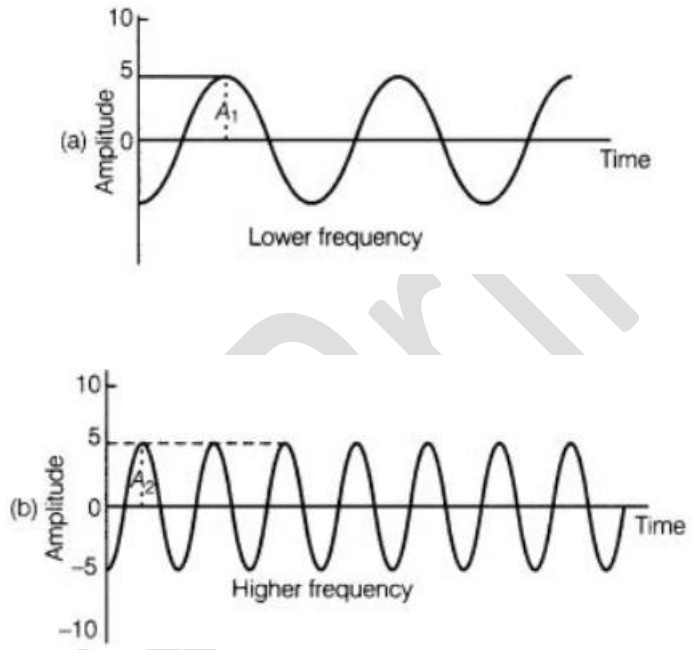
Long Answer Type Questions

Q18. 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 sound waves having different amplitudes and also different wavelengths.**

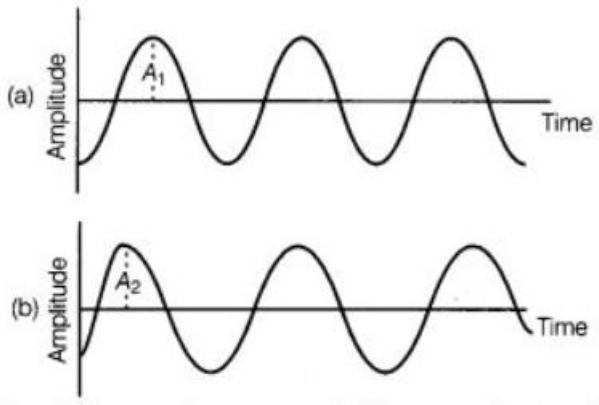
Answer:

i)



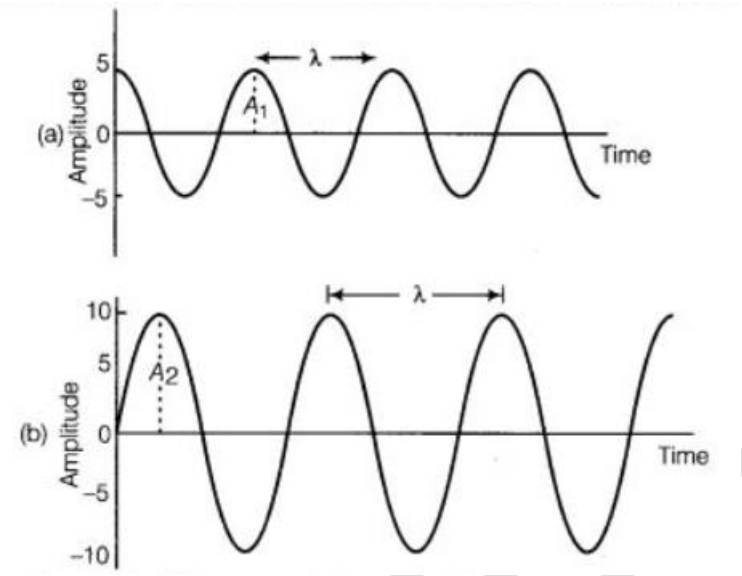
In figure a) and b), same amplitude and different frequencies (A_1 and A_2).

ii)



In figure a) and b), same frequency but different amplitude, that is, ($A_1 \neq A_2$)

iii)



In figure a) and b), they have different amplitudes and different wavelengths

$$A_1 \neq A_2, \lambda_1 \neq \lambda_2$$

Q19. Establish the relationship between speed of sound its wavelength and frequency. If velocity of sound in air is $340\ ms^{-1}$. Calculate

i) Wavelength when frequency is 256 Hz
ii) Frequency when wavelength is 0.85 m.

Answer:

The speed of sound is the distance which a wave, like a compression or a rarefaction, travels per unit time.

$$speed\ (v) = \frac{distance}{time} = \frac{\lambda}{T}$$

λ is the wavelength of the sound wave, which is the distance travelled by the sound wave in one time period (T) .

$$v = \frac{\lambda}{T} = \lambda \times \frac{1}{T}$$

Frequency f is ,

$$f = \frac{1}{T}$$

$$v = \lambda f$$

$$Speed = wavelength \times frequency$$

Speed of sound in air, $v = 340\ m/s$

Frequency, $f = 256\ Hz$

i) $Speed = wavelength \times frequency$

$$340 = \lambda \times 256$$
$$\lambda = \frac{340}{256} = 1.33\ m$$

ii) $wavelength, \lambda = 0.85\ m$

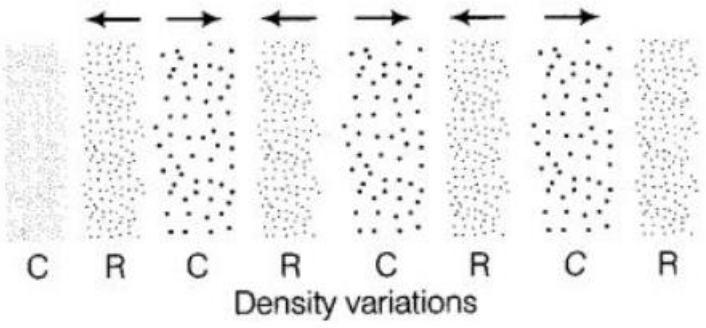
Frequency of sound in air,

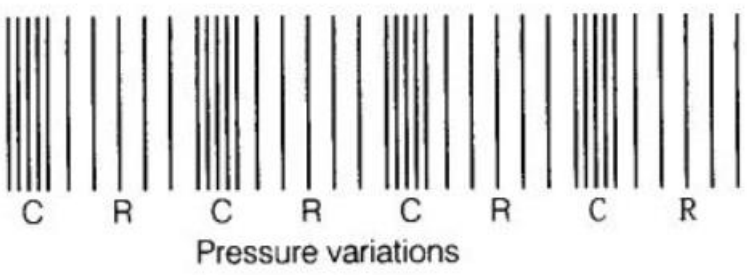
$$f = \frac{speed}{wavelength}$$
$$f = \frac{340}{0.85} = \frac{340 \times 100}{85} = 400\ Hz$$

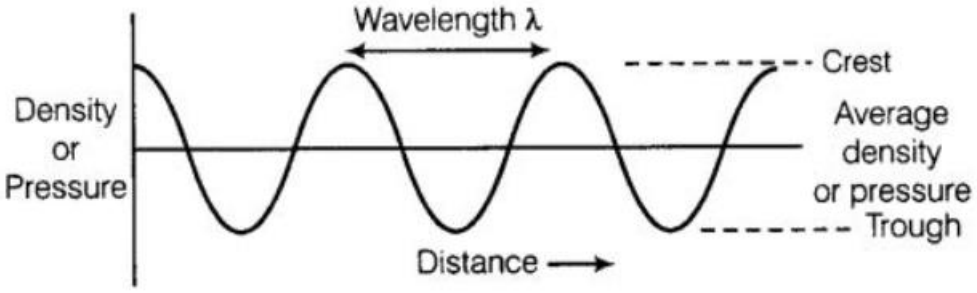
Q20. Draw a curve showing density or pressure variations with respect to distance for a disturbance produced by sound. Mark the position of compression and rarefaction on this curve. Also define wavelengths and time period using this curve.

Answer:

The curve of density or pressure variation is with respect to distance for a disturbance produced by sound.







Wavelength is the distance between two successive compression or rarefaction, denoted by λ.

Time period is defined as time taken by a wave to complete one cycle, so its particles are in same phase, denoted by T.