MULTIPLE CHOICE QUESTIONS

Choose the correct answer from the following choices:

i) Which is an example of a longitudinal wave?

a) sound wave **b)** light wave

c) radio wave **d)** water wave

ii) How does sound travel from its source to your ear?

a) by changes in air pressure **b)** by vibrations in wires or strings

c) by electromagnetic waves **d)** by infrared waves

iii) Which form of energy is sound?

a) electrical **b)** mechanical

c) thermal **d)** chemical

iv) Astronauts In space need to communicate with each other by radio links because:

a) sound waves travel very slowly in space **b)** sound waves travel very fast in space

c) sound waves cannot travel in space **d)** sound wave has low frequency in space

v) The loudness of a sound is most closely related to its:

a) frequency **b)** period

c) wavelength **d)** amplitude

vi) For a normal person, audible frequency range for sound wave lie between:

a) 10 Hz and 10 kHz **b)** 20112 and 20 kHz

c) 25 Hz and 25 kHz **d)** 30 Hz and 30 kHz

vii) When the frequency of a sound wave is increased, which of the following will decrease?

i) Wavelength ii) Period iii) Amplitude

a) I only **b)** iii only

c) i and ii only **d)** i and iii only

ANSWERS

(i)	a	**(ii)** a	**(iii)** b	**(iv)** c
(vi)	b	**(v)** d	**(vi)** b	**(viii)** c

REVIEW QUESTIONS

11.1 What is the necessary condition for the production of sound?

Answer

A vibrating body causes to produce sound. Due to vibration of bodies the air around them also vibrates and the air vibration produces sensation of sound in our car.

11. 2 What is the effect of the medium on the speed of sound? In which medium sound travels faster: air, solid or liquid? Justify your answer.

Answer

The speed of sound varies in different mediums. Like, the speed of sound in a liquid is five times that in gases; the speed of sounds in solid is about fifteen times that in gases. in liquids and solids, particles are closely packed which can transmit the effect of sound very quickly.

11. 3 How can you prove the mechanical nature of sound by a simple experiment?

Answer

Please see the topic.

11.4 What do you understand by the longitudinal wave? Describe the longitudinal nature of sound waves.

Answer

Longitudinal waves are such waves in which the particles of the medium vibrate parallel to the direction of propagation of the wave.

Such waves are consisted of compressions and rarefactions which causes to transfer energy.

11. 5 Sound is a form of wave. List at least three reasons to support the idea that sound is a wave.

Answer

Wave of any type can reflect, refract and diffract. Same three phenomenon's (reflection, refraction. diffraction) can also be observed in case of sound waves.

11.6 We know that waves manifest phenomenon of reflection, diffraction and refraction. Does sound also manifest these characteristics?

Answer

Yes, sound also manifests the characteristics of reflection, refraction and diffraction.

11.7 What is the difference between the loudness and intensity of sound? Derive the relationship between the two.

Answer

Sound energy flowing per second through a unit area held perpendicular to the direction of sound waves is called the intensity of sound. it is a physicals quantity so it does not depend upon the sensitiveness of the ear, whereas the magnitude of the sensation produced on the car by a sound is called its loudness.

[For deriving their relationship; please see the topic]

11.8 On what factors does the loudness of sound depend?

Answer

Loudness of sound depends upon the following factors:

1) Amplitude of the vibrating body.

2) Area of the vibrating body.

3) Distance from the vibrating body.

11. 9 What do you mean by the term intensity level 01' the sound? Name and define the unit of intensity level of sound.

Answer

The difference of some given loudness and the loudness of the faintest audible sound which is equal to the difference of logarithm of two intensities is called sound level as given below:

$$\text{Sound level} = 10 \log I / I_o (dB)$$

Or $$\text{Sound level} = 10 \log [\log I - \log I_o] dB \ .$$

The unit of sound level is "Bel".

Bel

If the given intensity of sound is 10 times greater than the faintest audible sound then the unit of sound level becomes equal to] bel.

11.10 What are the units of loudness? Why do we use logarithmic scale to describe the range of the sound intensities we hear?

Answer

The units of loudness are bel or decibel (dB). Logarithmic scale gives us the easy calculation to identify the intensity of sound.

11.11 What is difference between frequency and pitch? Describe their relationship graphically.

Answer

There is no as any difference in pitch and frequency. Pitch actually shows qualitative nature of sound whereas frequency gives us quantitative nature of sound; For graphical relationship, please see the topic. '

11.12. Describe the effect Of Change in amplitude on loudness and the effect of change in frequency on pitch of sound.

Answer.

1) By increasing amplitude of the vibrating body, the loudness also increases and vice versa.

2) By increasing the frequency of the vibrating body, the pitch increases as well and vice versa.

11.13 If the pitch of sound is increased, what are the changes in the following?

a) the frequency b) the wavelength

c) the wave velocity (d) the amplitude of the wave

Answer

a) Frequency increases.

b) Wave length decreases.

c) The wave velocity remains the same.

d) No change in the amplitude of the wave.

11. 14 If we clap or speak in front of a building while standing at a particular distance, we rehear our sound after sometime. Can we explain how does this happen?

Answer

Due to echo (reflection of sound).

11. 15 How can you find the speed of sound by echo method? What factors can affect the accuracy of this method?

Answer

Please see the topic.

11. 16 What is the audible frequency range for human ear? Does this range vary with the age of people? Explain.

Answer

Audible frequency range for human ear lies between 20 Hz and 20,000 Hz. It decreases with age. In hold people this range is up to 15000 Hz.

11. 17 Explain that noise is a nuisance.

Answer

Please see the topic.

11. 18 Describe the importance of acoustic protection.

Answer

Please see the topic.

11. 19 What are the uses of ultrasound in medicine?

Answer

Please see the topic.

CONCEPTUAL QUESTIONS

11. 1 Why two tin cans with a string stretched between them could be better way to communicate than merely shouting through the air?

Answer

In air sound spreads in all directions while in case of tin cans it confines in them with more intensity. Secondly speed of sound is much greater in solids than gases, that's why sound travels faster through string than air.

11. 2 We can recognize persons speaking with the same loudness from their voice. How is this possible?

Answer

Persons speaking with the same loudness may have different quality of sound or pitch, that's why it will be easy to identify between different sounds of the persons.

11.3 You can listen to your friend around a corner, but you cannot watch him/her; Why?

Answer

Sound and light may diffract from edges or comers if the wave length of the wave (sound or light) is comparable with the size of the comer.

The situation given in. the question indicates that sound waves will diffract from the corner due to larger wave length compared with the size of comer, whereas light waves (view of friend) have small wave length compared with the side of the comer so we cannot see the friend.

11. 4 Why must the volume of a stereo 'in a room with wall-to—wall carpet be tuned higher than in a room with a woodcut floor?

Answer

More vibrations are produced in a room with wooden floor than a carpeted floor which causes more loudness. That's why stereo volume is kept higher in carpeted room.

11. 5 A student says that the two terms speed and frequency 01' the wave refer to the same thing. What is your response?

Answer

No, speed and frequency are two different terms. Speed of wave means the distance covered by a wave between the two points in some certain interval of time while frequency is the number of waves passing through the same two points in unit time (one sec).

11. 6 Two people are listening to the same music at the same distance. They disagree on its loudness. Explain how this could happen.

Answer

If two persons are listening the same music at the same distance with different loudness shows that the medium between the music source and the first listener is air so more loudness will be heard while the other person may have some "all or obstacle in between the music source and him

Secondly, different loud nesses heard by these two persons may be due to their different physical condition of ears.

11. 7 Is there any difference between echo and reflection of sound? Explain.

Answer

Echo means the reflection of sound from a single wall or while reflection of wound may be from more than one surface.

11. 8 Will two separate 50 dB sounds together constitute a 100dB sound? Explain

Answer

Yes, two separate 50 dB sounds may have net 100 dB sound. If both the sound waves interfere constructively.

11. 9 Why ultrasound is useful in medical field?

Answer

Please see the topic.