SOUND

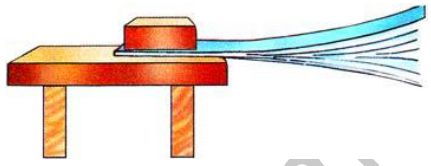
Sound is a form of energy which produces the sensation of hearing in our ear's.

HOW SOUND IS PRODUCED

The following activities will help you understand how sound is produced.

ACTIVITY

Place a metallic/plastic ruler on the table. Take care to place it in such a way that 2/3rds of the scale projects (just out) from the edge of the table. Place a heavy object such as a dictionary or a brick on the ruler. Now press the projecting end downwards and release it abruptly. What do you observe?



The part of the ruler which projects out from the edge of the table vibrating and producing sound

You wil see that the ruler snaps back and starts vibrating. At the same time, it also produces a sound. Once the vibrations stop, the sound also stops.

Vibrating Bodies Produce Sound

Cut a rubber band. Hold one end of it in your mouth and the other end in your hand and stretch it. Now, pull it with the other hand and release it (fig). What happens to the rubber band? You will notice that it moves to and fro or vibrates and it also produces sound.

Vibrations in a stretched rubber band produces sound

Sound from a Vibrating Blade

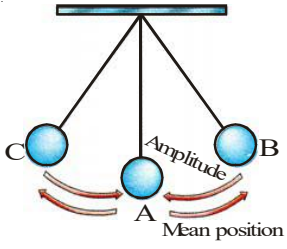
Take a used shaving blade and fix it on a table, or desk as shown in Fig. Bend the upper end of the blade and leave it. The blade begins to vibrate. You can actually see it vibrating. Touch the blade carefully with your finger. It stops vibrating. Does it produce any sound now?

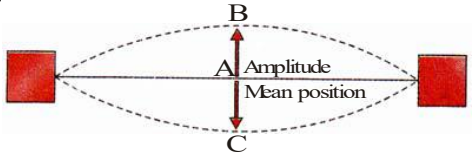
A vibrating shaving blade

Conclusion : From these activities, we come to the conclusion that the sound is produced by the vibrating objects or bodies.

Characteristic of Vibrations : In sound producing objects, the vibrations take place very fast...so fast, in fact, that they cannot be seen very clearly with the unaided human eye (slow-motion video is one practical solution that is routinely used in scientific and industrial applications). We can produce slower vibrations, which are also called **oscillations,** by an arangement called a **simple pendulum.**

It consists of a ball or any weight, such as a stone, wooden top, steel bolt, etc. which is here called a **bob,** and which hangs down vertically.





Figures show a oscillating simple pendulum and a vibrating string depicting the mean position and amplitude.

by means of a thread. It hangs vertically because of the force of gravity acting upon it. When the bob is given a small push, it performs a to-and-fro motion for some time and ultimately stops. The position where the bob stops is called the **mean position** (A) or the **equilibrium position.**

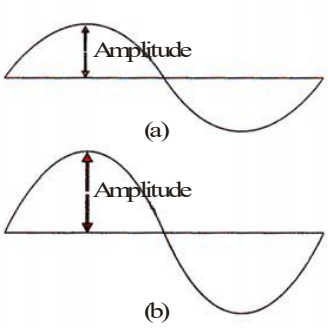


Figure shows two waves of different amplitudes but same frequency. Wave in diagram (a) is of softer sound as it has low amplitude wave in diagram (b) is louder, as it has high amplitude.

Additional Stuff

In the seven notes of Indian musical system sa, re, ga, ma, pa, dha, nee. the frequency increase from sa to nee.

AMPLITUDE

The maximum displacement of the bob from the mean position during oscilations is called amplitude of the oscillation. In the case of a simple pendulum, as show in the figure, the amplitude is AB (or AC).

FREQUENCY

The number of oscillations produced by the vibrating body in one second is called its frequency. It is denoted by the letter 'f'. The unit of frequency in SI system is **Hertz** (Hz or s^{-1}).

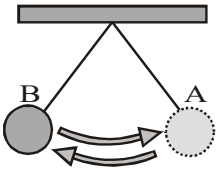
When a vibrating body produces 10 vibrations (oscillations) in one second, its frequency is said to be 10 hertz.

If the frequency of a tuning fork is written as 200 Hz, it means that it produces 200 vibrations in one second.

TIME PERIOD

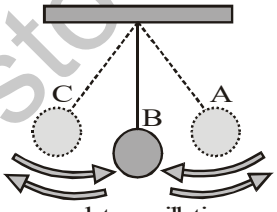
When a bob moves from one position and returns to the same position, such that it repeats the motion, it is said to complete on **oscillation.**

The time taken by a vibrating body to complete one oscilation is called the time period.



One complete oscillation or cycle is from A to B and back to A

OR



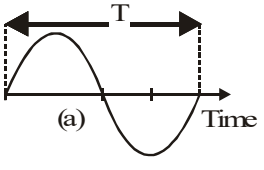
One complete oscillation or cycle is from A to B to C and back to A Moving in the same direction again

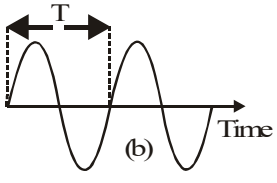
Time period is denoted by the letter **'T'** If 'f' is the frequency and 'T' is the time period, then f vibrations are complete in = 1s.

∴ one vibration is completed in $= \frac{1}{f}$ s.

∴ We know that the time taken to complete one vibration is its time period (T).

∴ $\boxed{T = \frac{1}{f}}$ or **Time period = 1/frequency.**





Wave (a) and (b) have same amplitude and therefore, same loudness. But frequency of wave (b) is greater than (a) because the time period of (b) is less than (a)

TRY YOUR SELF

Q. Define vibrations

Q. How is sound produced?

Q. What is meant by oscillatory motion?

Q. Define frequency.

Q. Give the unit in which frequency is measured.

Q. The sound from a housefly is produced when it vibrates its wings at an average rate of 300 vibrations per second. What is the time period of the vibration?

Q. The frequency of a given sound is 4.5 kHz. how many vibrations is it completing in one second?

REQUIREMENTS FOR SOUND

To produce sound by vibrations, a mechanical device (the source) must first receive an input of energy. Next, the device must be in contact with a medium that will receive the sound energy and carry it to a receiver. If the device is not in contact with a medium, the energy will not be transferred to a receiver, and there will be no sound. Thus, three basic elements for transmission and reception of sound must be present before a sound can be produced they are (1) the source (or transmitter), (2) a medium for carrying the sound (air, water, metal, etc.), and (3) the detector (or receiver).

Do You Know?

Sound travels in a material medium in the form of waves. These waves propagate in the medium by the vibrations of the particles of the medium

As shown above, each particle of the medium vibrates to and fro about its mean position along the direction of propagation of wave. Such a wave is called a longitudinal wave

COMPETITIVE WINDOW

TYPES OF WAVES

On the basis of the need of medium, waves are of two types :

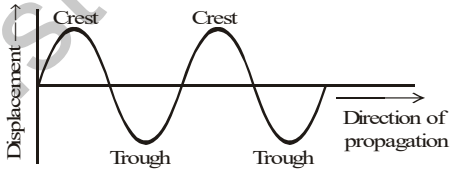
(a) Mechanical wave (b) Electromagnetic wave

(a) **Mechanical Wave :** A machanical wave is a periodic distrubance which requires a material medium for its propagation. The properties of these waves depend upon the medium so they are known as elastic waves, such as sound waves, water waves, waves in stretched string. On the basis of motion of particles the mechanical waves are classified into two parts :

(i) transverse wave (ii) Longitudinal wave

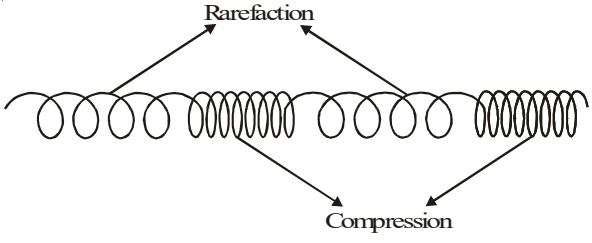
(i) **Transverse wave :** A wave motion in which the particles of the medium oscillate about their mean positions at right angles to the direction of propagation of the wave is called transverse wave. These waves can propagate through solids and liquids but not through gases because gases do not possess elastic properties.

E.g. – Vibration in strings, ripple on water surface etc. These waves travel in the form of **crests** and **troughs**.



(ii) **Longitudinal wave :** A wave motion in which the particles of the medium oscillate about their mean position is the direction of propagation of wave, is called longitudinal wave. These waves can propagate through solids, liquids and gases.

E.g. – Wave produced by compressing a spring, sound waves etc. They travel in the form of compressions and rarefactions.



Comparison between transverse and longitudinal waves :

S.No.	Transverse waves	Longitudinal waves
1	In these waves, vibration of the particles of the medium is perpendicular to the direction of propagation of the waves.	In these waves, vibration of the particles of the medium is in the direciton of propagation of the waves.
2	These waves travels in the form of crests and troughs.	These waves travel in the form of compressions and rarefactions.
3	The distance between two consecutive crests or troughs is called wavelength.	The distance between two consecutive compressions or rarefactions is called wavelength.
4	These waves can travel through solids and liquids only.	These waves can travel through solids, liquids and gases.

(iii) **Electromagnatic waves :** Electromagnetic wave is a periodic distrubance which does not require any material medium for its propagation and can travel even through vacuum.

E.g. – Light waves, X-ray and radio waves etc. These waves are of transverse type.

PROPAGATION OF SOUND

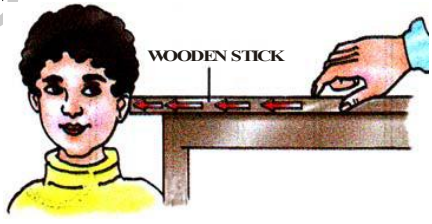
Unlike light, sound can travel only through a material medium. Hence a material medium is necessary for the propagation of sound. Let us do some activities to prove that sound can travel through solid, liquids and gases.

ACTIVITY

Sound Travels Through Solids

Take a wooden stick and press your ear at one end of it. Ask a friend to gently knock at the other end (fig) . You will be able to hear the sound very clearly.

This shows that **sound can travel through solids.**



Sound can travel through solids

Sound Travels Through Liquids

Place a squeaking toy in a polythene bag and hold it in a bucket of water (Fig) . Can you hear its squeak, when you squeeze it? Place your ear against the side of the bucket and squeeze the toy again. Do you hear its squeak? In which case did you hear the sound better? This activity shows that **sound can travel through liquids as well.**

Sound can travel through liquids

Sound Travels Through Gases

Fill a balloon with air and press it to your ear scretch the other end of it with your fingers (Fig) . You will note that the sound reaches your ear. This activity shows that **sound can also travel through gases.**

Sound can travel through air (gas)

SOUND CAN NOT TRAVEL IN VACUUM

A medium is needed for sound to travel. It can travel through any medium – solids, liquids and gases, but not in vacuum. Let us perform the following activity.

ACTIVITY

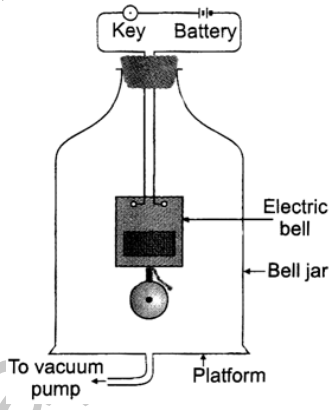
No movement in Vacuum

Take a bell jar and in it fit an electric bell through an air tight cork as shown in Fig. Place the bell jar on the platform of the vacuum pump and apply a little grease at its edges, so as to make it air tight. Connect the bell to a battery through a key (push button switch). Press the key. You will be able to hear the sound of the bell, as its hammer strikes against the gong. Now start the vacuum pump. It will be observed that as the air is withdrawn from the bell jar, the loudness of sound of the bell decreases. Furthermore, when a vacuum is created, no sound is heard, in spite of the fact that the hammer is striking against the gong.

Stop the vacuum pump and allow the air to enter the bell jar. The sound of the bell is heard again. This experiment proves:

(i) Sound cannot travel through vacuum

(ii) A material medium is necessary for the propagation of sound.



Sound cannot travel in vacuum

SPEED OF SOUND

Sound waves travel at different speeds in different substances. The speed of sound varies, depending on factors such as temperature, nature of material, physical state of the substance, etc. For example, the speed of sound in air at 20°C is about 340 m/s, but drops to about 330 m/s 0°C. Sound travels fastest in solids and slowest in gases. Sound does not travel in vacuum.

Speed of sound in different media

S.No.	Substance (20°C)	Speed of sound (m/s)
1	Air	340
2	Water	1482
3	Sea water at and 3.5% salinity	1522
4	Aluminium	6420
5	Granite	6000

ABSORPTION OF SOUND

It has been found that shining objects like mirrors, metals or hard objects like buildings or stones reflect sound. However, materials with loose texture absorb sound. For example, curtains; gunny bags; straw; carpets; etc., absorb sound. Big cinema halls or auditoriums are carpeted and their walls are coated with some rough materials, so that they do not reflect any sound. It is because, such places are very big and therefore, echoes are formed. Thus, the quality of sound heard by people becomes poor.

However, in ordinary rooms in which we live, we do not have this problem. It is because they are seldom 11 m or more long or wide. Thus, the original sound and reflected sound reach the ears at almost the same time and hence, no echo is formed.

CHARACTERISTICS OF A SOUND

(a) **Loudness :** When the string is plucked softly, it produces a feeble sound and when it is plucked hard, it produces a louder sound. In other words, in the first case vibrations with small amplitudes are produced and in the second case vibrations with large amplitudes are produced.

This means that the **loudness of a sound depends on the amplitude of vibration.** It is measured in decibels **(dB)**.

(b) **Pitch :** The shrillness or flatness of a sound is known as **pitch**. We can distinguish between a man's voice and woman's voice of the same loudness without even seeing whether the speaker is a man or a woman. A man's voice is flat and has a low pitch, Whereas a woman's voice shrill and has a high pitch. The pitch of a sound depends on the frequency of vibration. **The higher the frequency of a sound, the higher will be its pitch.** In other words, high pitched sounds (such as the shrill whistling of a kettle or a jet engine) are created at high frequencies. This is obviously why we whistle for our dog; the high pitched sound attracts him. You can get a special 'dog whistle' that emits a very high pitched sound at a frequency much beyond 20,000 Hz; humans cannot hear it, but your dog will come bounding up to you when he hears the sound (inaudible to you)!

(c) **Quality or Timber :** The characteristic of sound which enables us to distinguish between two sounds of the same pitch and loudness, produced by two diferent sources is called its **quality** or **timber.** For example, we can recognise a person by hearing his voice, we can also distinguish the sound of a guitar from that of a sitar or harmonium.

Difference between Loudness & Pitch

Loudness	Pitch
Loudness depends upon the amplitude of vibration of the vibrating body.	Pitch is the frequency perceived by a listener.
Loudness depends upon the energy received by the ear.	Pitch does not depend upon the energy received by the ear.
Loudness does not change with the change in frequency.	Pitch changes with the change in frequency.

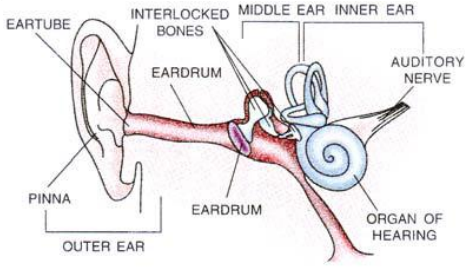
HOW WE HEAR SOUND THROUGH OUR EARS

Human Ear : We have learnt that vibrating objects produce sound which is carried in all directions in a medium. How do we hear sound? Our ears help us to hear sound. Human ear has three important parts. Only one of its parts can be seen and felt by you, which is the outer ear. The rest of the ear remains deep inside the skull.

(i) **Outer Ear :** The outer ear consists of the **pinna** and the **eartube.** The shape of the outer part of the ear is like a funnel. When sound enters the ear, it travels down a canal at the end of which a thin membrane is stretched tightly. This tightly stretched membrane is called the **eardrum,** which performs a very important function.

(ii) **Middle Ear :** It has three very tiny interlocked bones. **The innermost bone** is joined to the inner ear.

(iii) **Inner Ear :** It has a coiled organ of hearing semicircular canals and the auditory nerve.

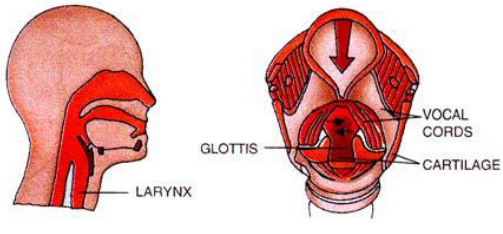


Sectional view of the ear

A vibrating body caues air molecules to vibrate. These vibrations reach out ear and are collected by the pinna and then funnelled into the ear tube. These vibrations stricke the eardrum that start vibrating with the same frequency. It then forces the interlocked bones to vibrate. The hearing organ passes the vibrations to the auditory nerve, which takes the signal to the brain. This enables us to hear the sound.

SOUND PRODUCED BY HUMANS

In a human being, sound is produced by a voice box (larynx). Two vocal cords are stretched across the voice box such that a passage for air remain between the cords. When we speak lungs force air through the passage due to which the cords start vibrating and produce sound. The tightness of the cords are controlled by the muscles connected to vocal cords.



LISTENING OF SOUND BY HUMANS

The ear has a stretched membrane called ear drum or tymphanic membrane. When sound reaches our ear it strikes the ear drum which starts vibrating. These vibrations are carried forward into the ear by a connection of bones (hammer, anvil and stirup). These are then converted into electrical signals which are interpreted by the brain.

AUDIBLE AND INAUDIBLE SOUND

It has been proved that the human ear is not sensitive to vibrations of all frequencies. In other words, we can only hear sounds that fall within a certain range of frequencies; any sound outside that frequency range is inaudible to our ears. We can hear sounds within frequencies ranging from **20 Hz to 20,000 Hz.** This is called **Audible frequency range of sound.** Such vibrations are called **sonic vibrations** or **sound vibrations.**

Sound frequencies less than 20 Hz are called **Infrasonic** sound and sound frequencies more than 20,000 Hz (20 k Hz) are called **Ultrasonic** sound. Human beings cannot perceive either infrasonic or ultrasonic sounds. Hence, these are called **'Inaudible'** sounds, i.e., sounds we cannot hear. Dogs, on the other hand, have much 'sharper' hearing, since they can hear sounds within the frequency range of 50 Hz to 45000 Hz ! That is why your dog starts braking a welcome long before you have reached your front door; he has heard your footfalls or recognised the distinctive sound of your car as it enters the gate. Almost all animals have a wide range of hearing. Bats can detect frequencies as high as 100,000 Hz!

SOUND PRODUCED BY ANIMALS

Most mammals such as dogs, cows, cats, etc. produce sound with the help of their vocal cords. Dogs can be easily trained to respond to a whistle which generates ultrasonic vibrations and is commonly called **Galton's whistle.**

Birds produce sound by means of a ring of cartilage called **Syrinx,** fixed at the beginning of their winds pipe. Some birds have two parts in the syrinx. Thus, they can produce two different notes. Insects such as bees, houseflies, mosquitoes produce buzzing sound by rapidly flapping their wings. Dolphins are related to the whale family. They use ultrasonic sound to locate their prey.

COMPETITIVE WINDOW

GALTON'S WHISTLE

Galton's Whistle, also known as a **dog whistle** is a type of whistle used in the training of dogs and cats. It was invented by Francis Galton. A dog whistle is within the range of 1600 Hz to 22000 Hz. The frequency range of a dog whistle is largely out of the range of human hearings.

Additional Stuff

A reflected sound wave is called an **echo.** When we speak, sound waves get reflected by nearby objects. The reflected wave arrive at our ears a little later than the original wave. If the time difference is large enough for our ears to distinguish between the original wave and the reflected wave, we hear an echo.

USES OF ULTRASONIC VIBRATIONS BY ANIMALS

1. Dogs can hear upto the frequency of 40,000 Hz as compared to humans who can hear upto 20,000 Hz. Dogs can be specially trained to respond to a whistle which produces ultrasonic vibrations and is commonly called Galton whistle. The sound of this whistle cannot be heard by humans.

2. Bats produce vibrations in the frequency range of 50 Hz to 80,000 Hz. Bats have very weak eyes. When the bats fly at night, they produce ultrasonic vibrations which cannot be heard by the humans or the insects. When these vibrations strike the insects, they are reflected back. On receiving the reflected sound, the bat can locate the insect and eat it.

3. Dolphins are related to the whale family. They use ultrasonic sound to locate their prey, in much the same way as the bats.

USE OF ULTRASONIC VIBRATIONS IN INDUSTRY

1. Ultrasonic vibrations are used for homogenising milk, i.e., the milk is agitated with ultrasonic vibrators. These vibrations break down the larger particles of the fat present in milk to smaller particles.
2. Ultrasonic vibrations are used in dish washing machines. In such machines, water and detergent are vibrated with ultrasonic vibrators. The vibrating detergent particles rub against the dirty utensils and thus clean them.
3. Ultrasonic vibrations produce a sort of depression in rats and cockroaches. Ultrasonic vibrators are used to drive rats and cockroaches from godowns.
4. Ultrasonic vibrations are used for imaging internal organs of human body. In fact they are even used to study the growth of foetus in mother's womb.
5. Ultrasonic vibrations are used in relieving pain in joints and muscles.
6. Ultrasonic vibrations are used in detecting flaws in articles made from metals. They are also used in finding the thickness of various parts of a metallic component.

NOISE AND MUSIC

A sound which does not have a pleasing sensation on the ears is **called noise**. Scientifically, a noise is produced by irregular vibrations. Conversely, a sound which has a pleasant sensation on the ears is **called music**. Scientifically, a musical sound is produced by regular vibrations. For example, the prong of a tuning fork or the string of a sitar vibrates at regular intervals and hence, they produce musical sound.

MEASURE OF LOUDNESS OF SOUND

The loudness of sound is measured in decibels (dB). It signifies the sound pressure level. Human ears can pick up sound from 10 dB to 180 dB. The loudness of sound is considered normal, if it is between 50 dB to 60 dB. A normal human being can tolerate loudness of 80 dB. The sound above 80 dB is painful and causes various health problems. The table given below gives the loudness of various sounds in decibels and their effect on human ear.

NOISE POLLUTION

The disturbance produced in the environment by undesirable, loud and harsh sound from various sources is called noise pollution.

No.	Source of sound	Loudness level	Effect of sound on human ear
1.	Whispering	10 dB - 25 dB	Just audible
2.	Radio or T.v. at low volume	30 dB - 40 dB	Quite audible - comfortable sou
3.	Conversation	50 dB - 60dB	Moderately loud sound
4.	Light vehicles	60 dB - 70dB	Very loud sound
5.	Mixer -cum-grinder/busy crossing	70 dB - 80dB	Very loud but tolerable sound
6.	Motor cycle - heavy vehicle	90 dB - 105dB	Noise, very loud and uncomforta
7.	Lightning	120 dB - 130dB	Very uncomfortable loud sound
8.	Jet aeroplane	130 dB and above	Painful sound

Noise pollution is a recent phenomenon of twentieth century. Increasing dependence of the man on various kinds of machines at home, or work place or factories, etc., has contributed a lot to the noise pollution.

The noise pollution at a particular place is determined by following factors :

(i) Loudness of the sound (ii) Duration of noise.

SOURCE OF NOISE

1. Noise in homes: Following are the causes of noise in homes. (i) television, (ii) radio, (iii) power music system, (iv) washing machines, (v) desert cooler, (vi) mixer-cum-grinder, (vii) vacuum cleaner, (viii) telephone, (ix) typewriter, (x) air conditioner.

2. Noise in surroundings: Following are the causes of noise in surroundings: (i) loud speakers used in marriages and religious places, (ii) exploding crackers on various functions, (iii) hawkers in the street, (iv) publicity announcements made by trading companies, (v) noise produced in the construction of houses, etc.
3. Noise in factories: All factories, big or small use machines, which invariably produce noise and hence contribute to noise pollution.
4. Noise due to transportation : This noise is produced by (i) trains, (ii) all kinds of petrol and diesel vehicles, (iii) aeroplanes, (iv) pressure horns used in automobiles.

HARMFUL EFFECTS OF NOISE POLLUTION

1. Noise in the surroundings interferes with conversation with another person.
2. A long exposure, to noise pollution may result in the loss of hearing.
3. Noise pollution reduces concentration and results in the loss of work efficiency.
4. Noise causes anger, tension and interferes with the sleep pattern of individuals.
5. Noise produces headaches, irritability and nervous tension.
6. Noise can cause loss of night vision as well as cause colour blindness.

PREVENTION AND CONTROL OF NOISE

In the modern society we cannot eliminate noise, but can lower its level to bearable limits by taking following measures :

1. The machines should be designed in such a way that they produce minimum noise.
2. All automobiles, electric generators, etc., should be provided with improved silencers.
3. The heavy vehicles should not be allowed in residential areas.
4. The use of loudspeakers for various social or religious functions should be banned.
5. The factories should be relocated far away from the residential areas.
6. At homes, T.V, radio, power music system, should be played at low volume.

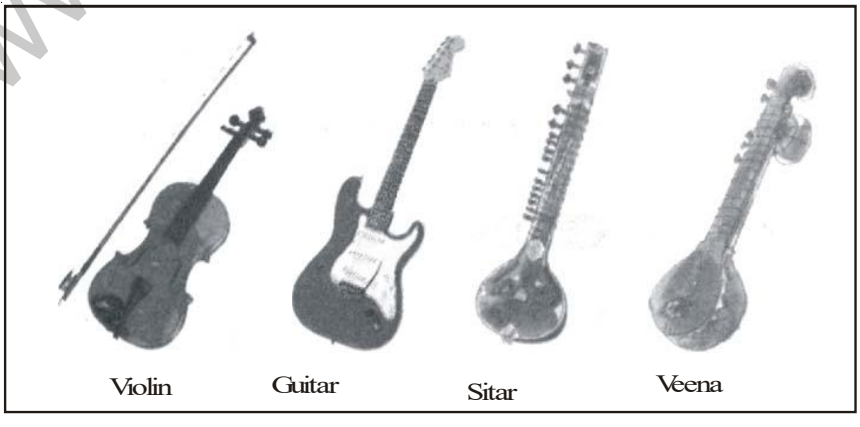
SOUNDS PRODUCED BY MUSICAL INSTRUMENTS

There are basically three families of musical instruments:

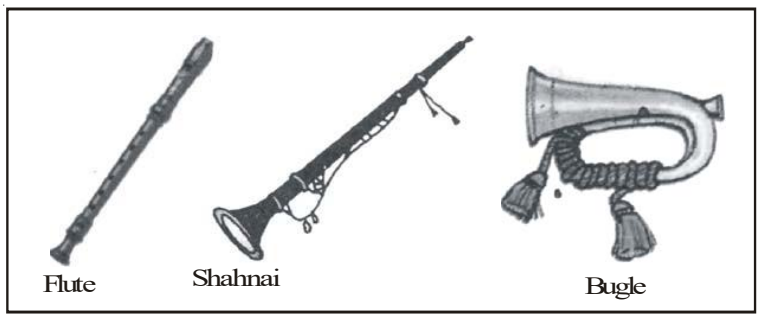
(a) STRINGED INSTRUMENTS (TANTU VADYA)

Stringed instruments have taut strings mounted over specially designed wooden frames, which are partially hollow from within.

When the strings are plucked or struck or played with a bow they vibrate to produce a musical sound of some particular frequency. The pitch of the sound of a musical instrument can be changed by altering its length.

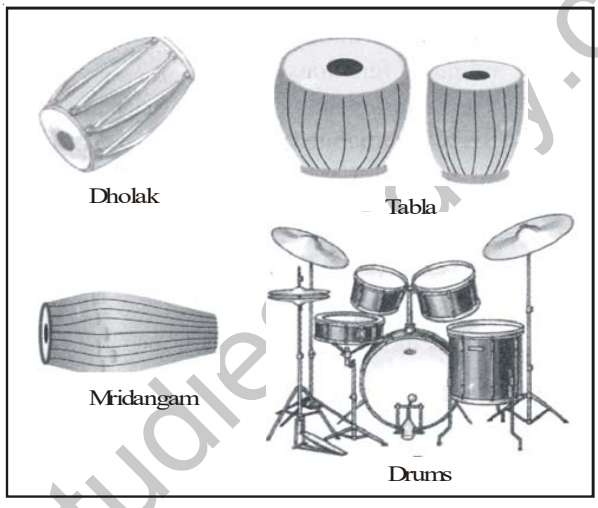


(b) **WIND OR REED INSTRUMENTS (SUSHIR VADYA)**



Wind instruments make use of vibrating air columns. In these instruments, the air is blown in, either directly or through the reeds. Flute, Shahnai, Bag pipes, Bugles, etc., are some of the examples of wind instruments.

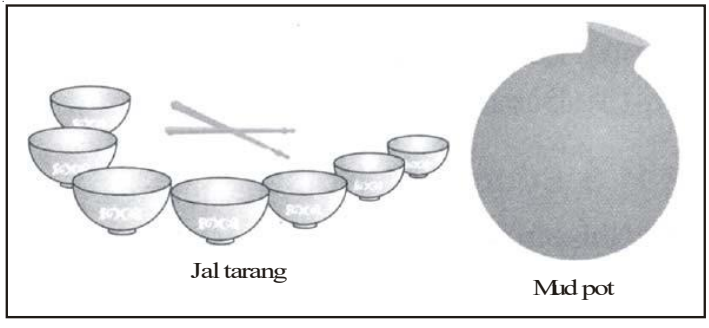
(c) **PERCUSSION OR MEMBRANE INSTRUMENTS (AVANADDHU VADYA)**



All percussion instruments have a taut skin over a hollow metal or wooden frame. When the skin is struck, it produces a musical sound. Dholak, tabla, mridangam and drums, etc., are some of the examples of percussion instruments. There are some other musical instruments which are exclusively used in our country, but do not belong to any of the above three kinds of musical instruments. They can be placed in a fourth class of musical instruments.

(d) **GHANA VADYA**

These instruments are simply beaten or struck in a rhythm.



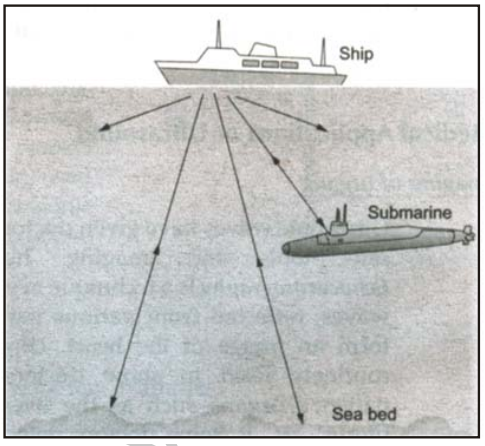
Manjira (cymbals), the ghatam (mud pots), jal tarang, etc., are some of the Ghana Vadya. These instruments are commonly used in all parts of our country.

COMPETITIVE WINDOW

SONAR

SONAR stands for Sound Navigation and Ranging.

It is a device which is used in the ships to locate rocks, icebergs, submarines, old ships sank in sea ete. It is also used to measure the depth of a sea.



PRINCIPLE

It is based on the principle of the reflection of sound wave (i.e. echo).

Determination of the Depth of a Sea using Sonar

A beam of ultrasonic waves from the transmitter of a SONAR fitted on the ship is sent towards the bottom of the sea. This beam is reflected back from the bottom of the sea and is received by the receiver of the SONAR on the ship.

The time taken by the ultrasonic waves to go from the ship to the bottom of the sea and then back to the ship is noted. Let it be 't' seconds. Therefore, the time taken by the ultrasonic waves to go from the ship to the bottom of the sea is $\left(\frac{t}{2}\right)$ seconds.

Using the following formula $S = v\left(\frac{t}{2}\right)$. we can find the depth of the sea.

Here, u = speed of ultrasonic wave in water.

S = depth of the sea

Q. A ship sends on a high frequency sound wave and receives an echo after 1 second. What is the depth of the sea? Speed of sound in water is 1500 m/ s.

Sol. Let,

Depth of the sea = d

So, Total distance travelled by the sound wave = 2d

Time taken by sound to travel both ways = 1 s

As per definition,

$$\text{Speed of the sound} = \frac{\text{Total distance travelled}}{\text{Time taken}}$$

Then, $1500\ m\ s^{-1} = \frac{2d}{1\ s}$

or $d = \frac{1500\ ms^{-1} \times 1s}{2} = 750\ m$

hus the depth of the sea is 750 metres.

Q. A sonar echo takes 2.2 s to return from a whale. How far away is the whale?

Sol. Total time taken by the signal = 2.2 s

So, Time taken the signal to reach the whale = $\frac{2.2\ s}{2}$ = 1.1 s

Distance of the whale = d ?

From the literature, speed of sound in sea water at 25°C = 1533 m s^{-1}

So, Distance of the whale, d = Speed of the signal x Time taken

or d = 1533 m s^{-1} x 1.1 s = 1686.3 m

TICK THE CORRECT OPTION

1. Sound is produced by ___

(A) Oscillation (B) Vibration (C) Compression (D) Combination

2. Sound is a form of ___ that produces the sensation of hearing in our ears.

(A) Heat (B) Gas (C) Energy (D) Speed

3. The vibrations started at a point from the source are transmitted in the ___ from that point to the nex and so on :

(A) Circle (B) Straightline (C) Sphere (D) Medium

4. Vibrations travel in all directions and produce compressions and ___ in the medium.

(A) Transformation (B) Rarefactions (C) Polarisation (D) Deformation

5. One complete ___ motion of the body is called one vibration.

(A) Circular (B) Linear (C) Forward (D) To and fro

6. The maximum displacement of a vibrating body from its rest or mean position is called its ___

(A) Time period (B) Vibration (C) Frequency (D) Ampitude

7. The amplitude of the vibrating strip is measured in ___

(A) Metre (B) Centimetre (C) Millimetre (D) Decimetre

8. The time taken by a vibrating body to complete one vibration is called its ___

(A) Frequency (B) Ampitude (C) Time period (D) Vibration

9. The number of complete vibrations that the vibrating body makes in one second is called its ___

(A) Ampitude (B) Vibration (C) Time period (D) Frequency

10. The frequency of sound produced by a vibrating body is ___ to the frequency of the vibrating body.

(A) Greater (B) Lesser (C) Equal (D) Partial

11. Frequency is measured in ___

(A) Amperes (B) Coloumbs (C) Hertz (D) Kelvin

12. Human beings cannot hear sound of frequencies below ___

(A) 15 Hz (B) 10 Hz (C) 20 Hz (D) 30 Hz

13. The range of frequencies from ___ is called the audible range.

(A) 20 Hz to 20,000 Hz (B) 10 Hz to 10,000 Hz

(C) 30 Hz to 30,000 Hz (D) 40 Hz to 40,000 Hz

14. Sounds of frequency higher than 20,000 Hz are called ___

(A) Panasonic (B) Ultrasonic (C) Subsonics (D) Supersonic

15. The sound of frequency lower than 20 Hz are called the ___

(A) Infrasonics (B) Supersonic (C) Panasonic (D) Ultrasonic

16. The infronic sound is used successfully in drilling deepest wells because the ___ vibrations break up hard rock more easily than the ordinary drill do.

(A) Low frequency (B) Medium frequency

(C) Unequal frequency (D) High frequency

17. The speed of sound depends on the elasticity E of medium and the ___ of the medium.

(A) Plasticity (B) Friction (C) Position (D) Density

18. The speed of sound is ___ in different media.

(A) Negligible (B) Equal (C) Differnet (D) Minute

19. The speed of sound does not depend on the ___ and the amplitude of the wave.

(A) Height (B) Wavelength (C) Thickness (D) Length

20. The speed of sound in air is independent of ___

(A) Density (B) Temperature (C) Pressure (D) Frequency

21. Te sound heard after reflection from a rigid obstacle is called the ___

(A) Refleciton (B) Refraction

(C) Deflecltion (D) Echo

22. To hear the echo of a sound distinctly, the reflecting surface should be at a minimum distance of ___ from the observer.

(A) 15.5 m (B) 16.6 m (C) 11.2 m (D) 18.6 m

23. Speed of sound at constant temperature depends on :

(A) Pressure (B) Density of gas (C) Above both (D) None of these

24. Echo is a type of :

(A) Reflected sound (B) Refracted sound (C) Polarised sound (D) None of these

25. One hertz is equivalent to :

(A) One cycle per second

(B) One second

(C) One metre per second

(D) One second per metre

26. The speed of sound in air at 0°C is approximately :

(A) 332 ms^{-1} (B) 350 ms^{-1} (C) 530 ms^{-1} (D) 332 kms^{-1}

27. A pulse is a wave :

(A) of long duration (B) of short duration

(C) Both (A) and (B) (D) None of these

28. In which medium sound travels faster?

(A) Solid (B) Liquid (C) Gas (D) None of these

29. The unit of quantity on which pitch of the second depends is :

(A) hertz (B) metre (C) metre/second (D) second

30. If a wave completes 24 cycles in 0.8 s, then the frequency of the wave is :

(A) 30 Hz (B) 8 Hz (C) 24 Hz (D) 12 Hz

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	B	C	B	B	D	D	A	A	C	A	C	B	A	B	A
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	D	D	C	B	B	D	C	D	A	A	A	B	A	A	A

FILL IN THE BLANKS

1. The frequency of sound is measured in .....
2. The maximum displacement of a vibrating body from its position of rest is its .....
3. The frequency of ultrasonics is .....than the range of human hearing.
4. Sound vibration die out after travelling some distance due to the loss of .....
5. Sound needs a ..... to travel.
6. Industrial noise can be reduced by proper .....
7. The reflecting surface has to be at least ..... away for us to hear an echo distinctly.
8. Only vibrating bodies produce .....
9. The unit of loudness of sound of .....
10. The sound travels faster in ..... as compared to liquids.
11. The ..... of sound produced by a vibrating string decrease with the increase in length.
12. Any vibrating body produces .....
13. The number of vibrations per second is called .....
14. Time taken by an object to complete one oscillation is called .....
15. Loudness is determined by ..... of vibration.
16. The unit of frequency is .....
17. Ultrasonic's are frequencies greater than .....
18. Galton whistle produces sound of frequency greater than .....
19. Unwanted sound is called .....
20. Sound having more frequency is called a ..... Pitch sound.
21. Pitch increases with the increase in the ..... of a vibrating body.
22. The ..... of a sound is that characteristic by virtue of which we can distinguish between two sounds of the same pitch and loudness produced by two different instruments.
23. Sound is produced when a body .....
24. We hear sounds with frequencies between .....Hz and .....Hz.
25. The loudness of a sound depends on the ..... of the vibration.
26. The number of vibrations per second is called .....
27. Pitch of sound depends on .....of vibration.
28. Sound travels fastest in .....and least in .....
29. Irregular vibrations produce .....
30. Regular vibrations produce .....

WRITE TRUE OR FALSE THE FOLLOWING STATEMENTS

1. Sound can travel through vacuum.
2. Sound travels faster in solids than in air.
3. Women can bear a frequency of 15 Hz.
4. Amplitude is the maximum displacement of a particle from the mean position.
5. SI unit of frequency is hertz (Hz)
6. The more the amplitude of a vibrating body, the more is the loudness.
7. Frequencies less than 20 Hz are called ultrasonics.
8. Sitar is a stringed instrument.
9. The distance travelled by an ocillating object during one oscillation is called amplitude.
10. The number of vibrations produced by a vibrating body in one second is called the frequency of the vibrating body and it is also equal to the frequency of the sound produced.
11. The SI unit of time is Hertz.

12. Sound above 20,000, Hz is called infrasonic.

13. Loudness of a sound depends on the amplitude of the vibrating object.

14. Pitch depends on the amplitude of the vibrating object.

15. The sounds produced by different whistles are the same.

16. Louder the sound lesser is the amplitude of vibrating body.

17. Sound travels slower in water as compared to air.

18. The speed of sound in air is 5100 ms^{-1}.

19. Unwanted or unpleasant sound is termed as music.

20. Noise pollution cannot cause partial deafness.

MATCH THE ITEMS IN COLUMN-A WITH THE ITEMS IN COLUMN-B

		Column-A		Column-B
1.	(A)	Stringed instrument	(i)	Flute
	(B)	Percussion instrument	(ii)	Guitar
	(C)	Wind instrument	(iii)	Table
	(D)	Unit of frequency	(iv)	Percussion instrument
	(E)	Tabla	(v)	Hertz
	(F)	Galton's whistle	(vi)	Dog's Training

		Column-A		Column-B
2.	(A)	Eardrum	(i)	Infrasonics
	(B)	Maximum displacement of an oscillating object	(ii)	Ultrasonics
	(C)	Sound with a frequency more than 20000 Hz	(iii)	Amplitude
	(D)	Low frequency sound which we cannot hear	(iv)	Detects sound

ANSWER KEY

Fill in the blanks.

1. Hertz **2.** Amplitude **3.** Below 20 khz **4.** Energy **5.** Medium **6.** Machine **7.** 11 m **8.** Sound **9.** dB **10.** Solid **11.** Frequency **12.** Sound **13.** Frequency **14.** Time period **15.** Amplitude **16.** Hertz **17.** 20 khz **18.** 30 khz **19.** Noise **20.** high **21.** Frequency **22.** Quality **23.** Vibrating **24.** 20 hz, 20 khz **25.** Amplitude **26.** Frequency **27.** Amplitude **28.** Solid, gas **29.** Noise **30.** Music

True & False

1. F **2.** T **3.** F **4.** T **5.** T **6.** T **7.** F **8.** T **9.** T **10.** T **11.** F **12.** F **13.** T **14.** T **15.** F **16.** F **17.** F **18.** F **19.** F **20.** F

SUBJECTIVE TYPE QUESTIONS

(A) Answer the following in one word or very briefly.

1. What is sound?
2. What proudces sound?
3. Do all vibrating bodies produce sound? Give an example.
4. What is frequency?
5. What is Galton whistle?
6. What is the frequency range upto which bats can hear?
7. What is the upper limit of sound dogs can hear?
8. Name a few sources of sound.
9. What is the range of audible frequency for human beings?
10. What are sounds having frequency greater than 20000 Hz called?
11. What are sound having frequency less than 20 Hz called?
12. What do you understand by the term quality of sound?
13. In which medium sound travles (i) slowest (ii) fastest.
14. What is the recommended intensity of sound for human beings?
15. Name a medium in which sound cannot propagate.
16. Write the standard international unit of frequency.
17. What is the frequency range for ultrasonic and infrasonic sounds?
18. Which sounds are called noise?
19. Is sound a form of energy?
20. Name two animals which can hear ultrasonic vibrations.
21. Name some pleasant and unpleasant sounds?
22. Which is an audible sound?
23. Does a short or long air column produce a shrill note of high frequency?
24. Does men's or women's voice have high frequency?
25. Name any two percussion instruments.

(B) Answer the following brief.

1. Define the two characteristics of sound.
2. Name two animals which can hear ultrasonic vibrations.
3. What makes our vocal cords vibrate?
4. How does the sound of a woman differ from that of a man?
5. State two differences between pitch and loudness.
6. What do you understand by the term noise? What is noise pollution
7. Suggest two ways of minimising noise pollution from your
   i. Home _____
   ii. Automobile _____
8. State three harmful effects of noise pollution of the workers working in factories.
9. State two difference between musical sound and noise.
10. What are the hazards of noise pollution?

(C) Answer the following in appropriate detail

1. State four uses of ultrasonic vibrations.
2. Why is sound of a sitar different from the sound of a drum?
3. Explain the terms – frequency, time period and amplitude.
4. How can you find the speed of sound in air?
5. Explain sound pollution. give two reasons for sound pollution.
6. Describe experiments to show that : (i) Sound can travel through liquids (ii) Sound can travel through solids.
7. What is the difference between infrasonic and ultrasonic sounds?
8. What are the factors on which pitch of a sound depend?
9. With the help of an experiment prove that sound cannot travel in vacuum.
10. How do we hear sounds through our ears? Explain.

VERY SHORT ANSWER TYPE QUESTIONS

1. What is the length of vocal cords in men?

Ans. The vocal cords in men are about 20 mm long.

2. What is meant by oscillatory motion?

Ans. The to and fro motion of an object is known as oscillatory motion.

3. Define 1 hertz.

Ans. A frequency of 1 hertz meas one oscillation per second.

4. Define amplitude.

Ans. The maximum distance to which a vibrating body moves on either side of its mean position is called the amplitude of vibration.

5. How are frequency of a sound and pitch related?

Ans. If the frequency of vibration is higther than the sound has a higher pitch.

6. Name the equipment which works at frequencies greater than 20,000 Hz.

Ans. Ultrasound equipment.

7. What is meant by noise pollutoin?

Ans. Presence of excessive or unwanted sound in the atmosphere is called noise pollution.

8. Name the SI units of (i) time period (ii) frequency.

Ans. (i) Second (ii) Hertz.

9. What happens to sound when it strikes a surface?

Ans. Sound gets reflected on striking a surface.

10. Why do we hear the sound of the horn of an approaching can before the car reaches us?

Ans. This happens because the speed of sound is much greater than the speed of the car.

SHORT ANSWER TYPE QUESTIONS

11. The sound from a mosquito is produced when it vibrates its wings at an average rate of 500 vibrations per second. What is the time period of the vibration?

Ans. Time taken for 500 vibrations = 1 second

Time taken for 1 vibration = $\frac{1}{500}$ second

Time period = $\frac{1}{500}$ second.

12. If the amplitude increases 3 times, by how much will the loudness increase?

Ans. If the amplitude increases three times, the loudness will increase by a factor of 9 times.

13. The frequency of a given sound is 1.5 khz. How many vibrations is it completing in one second?

Ans. Frequency = $\frac{\text{No. of vibrations}}{\text{Time}}$, No. of vibrations = Frequency × Time

= 1.5 × 1000 × 1 = 1500 vibrations

14. We cannot hear the sound of the exploding meteros in the sky, though we can see then. Why?

Ans. Sound cannot travel through vacuum, In space there is vaccum. Light can travel through vacuum, so we can see the exploding meteor but cannot hear the explosion.

15. We can hear the supersonic jet planes flying. How?

Ans. The supersonic jet planes fly in the air. Since sound can travel through air, we can hear then flying.

15. How do birds and insects produce sound?

Ans. Birds chirp with the help syrinx in their wind pipe. Insects produce sound by flapping their wings.

16. (a) In our body which part of the ear receives sound waves?

(b) What may happen if the ear drum is does not from our ear?

Ans. (a) Pinna helps in receiving sound waves.

(b) If the eardrum is absent we would not be able to hear.

17. Give an example each of :

(a) Stringed instrument **(b) Percussion instrument**

(c) Wind instrument **(d) Striking instrument**

Ans. (a) Violin (b) Drums (c) Flute (d) Jal Tarang

18. Can sound travel through water? How do whales communicate under water?

Ans. Yes, sound can travel through water. Since sound can travel through water, the whales can communicate with each other.

19. How is that you can hear a friend talking in another room without seeing him?

Ans. Sound can travel in all directions and around corners. Light cannot travel around corners. Therefore, we can hear a friend talking in another room but cannot see him.

ANSWER THE FOLLOWING IN BRIEF

20. List sources of noise pollution in your surrounding.

Ans. The major sources of noise pollution are sounds of vehicles, explosions, machines, loudspeakers.

21. How can the noise pollution be controlled in residential area.

Ans. (a) The noisy operations must be conducted away from residential areas.

(b) Noise producing industries should be set away from such areas

(c) Use of automobile horns be minimized.

(d) TV and music systems should be run at lower volumes.

22. A pendulum oscillates 40 times in 4 seconds. find its time period and frequency.

Ans. 40 vibrations in 4 seconds.

10 vibrations in 1 second

$\therefore$ Frequency = 10 vibrations/sec. or 10 Hz

$\therefore$ Time period = 1/10 sec.

23. Your parents are going to buy a house. They have been offered one on the roadside and another three lanes away from the roadside. Which house would you suggest your parents should buy? Explain your answer.

Ans. I would advise my parents to but the house three lanes away from the roadside because there the noise from automobiles would be much less.

24. Why is the voice of men, women and children different?

Ans. The voice of men, women and children are diferent because the length of vocal cords are different. The lenth of vocal cords is longest in men and shortest in children.

ANSWER THE FOLLOWING IN APPROPRIATE DETAIL

25. Sketch larynx and explain its function in your own words.

Ans. We produce in the larynx of our throats. The larynx has two vocal cords, which are folds of tissue with a slit like opening between them. When we speak, air passes through the opening and the vocal cords vibrate to produce sound.

26. Lightning and thunder take place in the sky at the same time and at the same distance from us. Lightning is seen earlier and thunder is heard later. Can you explain why?

Ans. The speed of light is more than the speed of sound. Therefore, even through thunder and lightning take place simultaneously, we see the lightning earlier.

27. (i) Why is SONAR?

(ii) What is the basic principle of its working?

(iii) Explain its use.

Ans. (i) SONAR refers to sound Navigation and Ranging.

(ii) The principle of reflection of sound is used in SONAR.

(iii) SONAR is used to measure the depth of the ocean. Ultrasonic waves are sent from the ship down into the sea. They are received back after reflection from the sea bex. The depth is calculated by nothing the time period.

28. What is the use of ultrasound in medicine and industry?

Ans. Use of ultrasound in medicine :

(i) For scanning and imaging the body for stones, tumour and foetus.

(ii) For relieving pain in muscles and joints.

Use of ultrasound in industry:

(i) For detecting finer faults in metal sheets.

(ii) In dish washing machines were water and detergent are vibrate with ultrasonic vibrators.

(iii) For homogenising milk in milk plants

29. What is a sonogram? Why is it preferred to X-ray?

Ans. Sonogram is image of the internal organs. Ultrasound can p[ass through the human body and are reflected back. The reflections are recorded by computer and images are generated on the screen.

Sonogram is not harmful adn is therefore used for studying the foetus or stone or tumor in the organs. On the other hand, X-ray can be harmful if humans are exposed for longer time.

30. (i) Name a property of sound which is (a) Similar to the property of light (b) Different from that of light.

(ii) Why do some people have hearing impariment? How do they communicate with others?

Ans. (i) (a) The property of sound similar to light is that in both reflection takes palce

(b) Sound can travel maround corners but light cannot.

(ii) Some people suffer from hearing impariment because ther ear drum is damaged or absent. This can be from birth or may occur later on. Such people communicate with "sign language". They can also use "hearing aids".

EXERCISE-5 (COMPETITIVE EXAMINATION)

Tick (✓) the correct choice among the following

1. If a pendulum is allowed to oscillate into a jar containing water, its time period will

(A) increase (B) decrease (C) remain same (D) none of these

2. If a pendulum is allowed to oscillate in vacuum, its time period will

(A) decrease (B) increase (C) remain same (D) none of these

3. If the mass of a pendulum is doubled, the time period

(A) becomes double (B) becomes half (C) becomes 4 times (D) remains the same

4. The phenomenon in which the amplitude of oscillation of a pendulum decreases gradually is called

(A) decay period of oscillation (B) damping

(C) building up of oscillation (D) maintained oscillation

5. In which of the following media will sound travel the fastest?

(A) Solid (B) Both solid and liquid (C) Liquid (D) Gas

6. Sound waves in air are waves.

(A) longitudinal (B) radio (C) transverse (D) electromagnetic

7. Out of the following, which frequency is not clearly audible to the human ear?

(A) 30 Hz (B) 30,000 Hz (C) 300 Hz (D) 3000 Hz

8. Sound waves are

(A) transverse mechanical waves (B) longitudinal mechanical waves

(C) neither (A) nor (B) (D) none of these

9. The time period of the above wave would be

(A) 1/30 s (B) 30 s (C) 1/24 s (D) none of these

10. The relation between frequency (n) and wavelength (λ) is given by (v is velocity, n is frequency and T is time-period)

(A) $v = n\lambda$ (B) $n = \frac{\lambda}{v}$ (C) $v = \frac{n}{\lambda^2}$ (D) $n = \frac{T}{\lambda}$

11. A body produces sound only if it is

(A) made of steel (B) made of glass (C) plucked (D) vibrating

12. A crest is the point of

(A) zero displacement (B) maximum displacement

(C) minimum displacement (D) none of these

13. A trough is a point of

(A) zero displacement (B) maximum displacement

(C) minimum displacement (D) none of these

14. Velocity of sound is maximum in

(A) iron (B) mercury (C) water (D) air

15. The vibrating body while playing a violin is

(A) wire (B) the box of the violin (C) both wire and box (D) only air

16. The waves which propagate in metals are

(A) longitudinal (B) transverse (C) both (A) and (B) (D) neither (A) nor (B)

17. Velocity of sound is minimum in

(A) nitrogen (B) hydrogen (C) air (D) carbon dioxide

18. The speed of electromagnetic waves in air is

(A) 3×10^5 km/s (B) 3×10^6 km/s (C) 3×10^7 km/s (D) 3×10^8 km/s

19. Which of the following types of waves is different from others?
(A) waves in the strings of musical instruments (B) water waves
(C) light waves (D) sound waves

20. The SI unit of amplitude of oscillation is
(A) cm (B) m (C) km (D) none of these

21. Echo is produced due to
(A) reflection of sound (B) refraction of sound
(C) resonance (D) none of these

22. SONAR is based on the principle of
(A) echo (B) resonance (C) reverberation (D) anyone of the above

23. The audible range of frequency is
(A) 20 Hz to 20,000 Hz (B) 40 Hz to 40,000 Hz (C) 60 Hz to 60,000 Hz (D) 10 Hz to 20,000 Hz

24. Which of the following frequency of sound can't be heard by human beings?
(A) 40 Hz (B) 400 Hz (C) 4000 Hz (D) 40,000 Hz

25. The depth of the troughs of a wave is called its
(A) amplitude (B) displacement (C) frequency (D) none of these

26. The height of the crests of a wave is called its
(A) amplitude (B) displacement (C) frequency (D) none of these

27. A sound wave is travelling from East to west. In which direction do the molecules in the air move?
(A) East to West (B) West to East (C) North to South (D) South to North

28. The number of crests passing a given point in one second is (where T is time period and v is frequency)
(A) T (B) v (C) 2T (D) 2v

29. The time taken by a crest to travel a distance λ. is
(A) $\frac{T}{2}$ (B) $\frac{T}{4}$ (C) $\frac{T}{8}$ (D) T

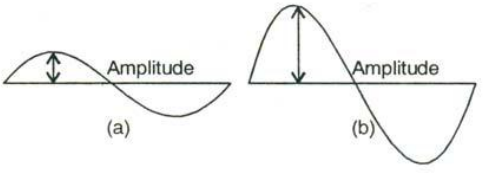
30. What name has been given to the wave of short duration?
(A) pulse (B) periodic wave (C) elastic wave (D) none of these

31. Sound is caused due to
(A) Vibrations (B) Propagation of light
(C) Change in Physical State (D) (A) and (C) both

32. Sound cannot travel through vacuum because
(A) There are no vibrations (B) There is no medium present in vacuum
(C) Sound travels in straight line (D) None of these

33. The loudness of a sound depends on its __ of vibration.
(A) Oscillations (B) Frequency
(C) Amplitude (D) (B) and (C) both

34. Which figure shows the softer sound and why?
(A) Figure (A) because it has low amplitude wave
(B) Figure (B) because it has high amplitude wave
(C) Both (A) and (B)
(D) None of these



35. The audible frequency range of sound is
(A) 20 HZ to 2000 HZ (B) 40 HZ to 4000 HZ
(C) 20 HZ to 20000 HZ (D) (A) and (B) both

36. The speed of sound wave in air at room temperature is

(A) 364 m/s (B) 346 m/s (C) 3×10^8 m/s (D) None of these

37. In humans, the sound is produced by

(A) Larynx (B) Windpipe (C) Throat (D) (A) and (B) both

38. The intensity of sound decreases with increase in distance.

(A) Because sound needs a medium to travel

(B) Because sound energy is lost during propagation of sound

(C) Because loudness of sound depends upon amplitude of vibration

(D) None of these

39. In the seven notes of Indian music system sa, re, ga, ma, pa, dha, nee the frequency

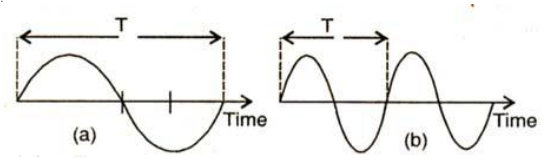
(A) Increases from nee to sa (B) Decreases from sa to nee

(C) Increases from sa to nee (D) (A) and (B) both

40. If a pendulum has a time period of 3 seconds"then its frequency will be

(A) 3 HZ B) 3 Seconds (C) 0.33 HZ (D) (A) and (C) both

41.



(A) Frequency of wave (A) is greater than wave (B) (B) Frequency of wave (B) is greater than wave (A)

(C) Cannot be determined (D) None of these

42. What is the relationship between frequency and pitch?

(A) The higher the frequency of a sound, the lower will be its pitch

(B) The higher the frequency of a sound, the higher will be its pitch

(C) The lower the frequency of a sound, the higher will be its pitch

(D) None of these

43. Ultrasonic waves are used in SONAR to

(A) Detect the frequency of the waves (B) Detect the radio waves

(C) Detect objects on sea bed (D) (A) and (C) both

44. Why are percussion instruments are widely used to keep beats in a musical composition?

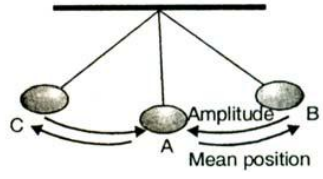
(A) Because range of frequencies and pitches produced by these instruments is very large

(B) Because range of frequencies and pitches produced by these instruments is limited

(C) Both

(D) None of these

45. The position where the bob stops is



(A) Right extreme position

(B) Left extreme position

(C) Mean position

(D) None of these

46. Echo is the effect produced due to

(A) Reflection of sound (B) Refraction of sound

(C) Dispersion of sound (D) (A) and (B) both

47. Tick the odd one out

(A) Amplitude (B) Frequency

(C) Acceleration due to gravity (D) (A) and (C) both

48. The wall of the auditorium built for musical concerts should .....

(A) Transmit

(B) Absorb

(C) Reflect

(D) None of these

49. The stethoscope used by doctors works on the principal of

(A) Reflection of sound

(B) Interference of sound

(C) Refraction of sound

(D) (A) and (B) both

50. Bats send out ..... squeaks that humans cannot hear.

(A) Low frequency

(B) High frequency

(C) Low Pitch

(D) None of these

51. Objects vibrating faster have a ..... pitch.

(A) Louder (B) Lower (C) Higher (D) (A) and (B) both

52. Which travel faster through the emptiness of outer space than through the earth's atmosphere?

(A) Light (B) Sound (C) Both (D) None of these

53. Objects vibrating faster have a ..... frequency.

(A) Lower (B) Neutral (C) Higher (D) (A) and (B) both

54. Which sound has a higher frequency?

(A) The music of a tabla

(B) The music of a flute

(C) Both (A) and (B)

(D) None of these

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	A	A	D	B	A	A	D	B	A	A	D	B	C	A	C
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	D	D	A	D	B	A	A	A	D	A	A	A	B	D	A
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	A	B	C	A	C	D	A	B	C	B	B	B	C	B	C
Que.	46	47	48	49	50	51	52	53	54						
Ans.	A	C	B	A	B	C	A	C	B						

Important Notes