18. Sound : Production of

1. Fill in the blanks.

(i) Sound is generated by the rhythmic.....of any object.

(ii) The Frequency of sound is measured in ..... .

(iii) If..... of sound is decreased, its loudness also decreases.

(iv) A Medium is necessary for ..... of sound.

(v) A stretched rubber returns to its original state when it is released. This property is called ..... .

(vi) The number of oscillations completed by an oscillator in one second is called the..... .

Ans : (i) Vibrations (ii) Hertz (iii) amplitude (iv) propagation (v) elasticity. (vi) frequency of oscillation

2. Match the pairs.

Group 'A'	Group 'b'
(a) Flute	(1) Frequency less than 20 Hz
(b) Frequency	(2) Frequency more than 20000 Hz
(c) Sound level	(3) Vibrations in the air
(d) Ultrasonic sound	(4) Measured in Hz
(e) Infrasonic sound	(5) Decibel

Answer :

Group 'A'	Group 'b'
(a) Flute	(3) Vibrations in the air
(b) Frequency	(4) Measured in Hz
(c) Sound level	(5) Decibel
(d) Ultrasonic sound	(2) Frequency more than 20000 Hz
(e) Infrasonic sound	(1) Frequncy less than 20 Hz

3. Give the scientific reasons.

(a) In earlier times, people used to listen for the arrival of a distant train by putting their ear to the rail.

Ans : (1) While the train runs on the rail, its wheels bang on the rail and friction occurs. (2) These banging and friction produce vibrations and sound is produced

(3) These vibrations propagate to a large distance through rail. (4) If ear is put to the rail this sound can be clearly heard and the arrival of a train can be guessed. Thus, in earlier times, people used to listen for the arrival of a distant train by putting their ear to the rail.

(b) The sounds generated by a tabla and sitar are different.

Ans : (1) The stretched diaphram of a tabla when strucked produces vibrations which generates the sound. (2) The stretched string of a sitar when plucked produces vibrations which generates the sound. (3) In this way, due to the difference in the vibrating object, the frequency of vibrations from both the objects is different, and the pitch of sound is also different. Thus, the sound generated by a tabla and sitar is different.

(c) If you were both on the moon, your friend will not be able to hear you call.

Ans : (1) Medium is necessary for the propagation of sound. (2) There is no atmosphere on the moon as that of the earth and thus due to absence of medium sound

does not propagate while talking on the moon. This is the reason, why your friend will not be able to hear your call.

(d) We can hear the movement of a mosquito's wings but we cannot hear the movement of our hands.

Ans : (1) The up-down movement of a mosquito's wings occur very fast. In one second, it's wings move about 300 to 600 times. That means, the frequency of movement of the wings is 300 Hz to 600 Hz

4. Write answers to the following questions.

(a) How is sound produced ?

Ans : Vibrations are produced in an object when it is struck. Vibrating object is a source of sound. The rhythmic vibrations of an object produces sound.

(b) What does the intensity of sound depend upon ?

Ans : The intensity of sound depends upon :

(1) Amplitude of vibrations : The intensity of sound is proportional to the square of the amplitude of vibration.

(2) Frequency of vibratio1ns : if frequency is higher then intensity of sound is also higher.

(3) Distance from the source of sound : if the distance between the listener and the source of sound is less, than intensity of sound can be felt greater.

(c) Explain how the frequency of oscillation is related to the length of a pendulum and the amplitude of its oscillation.

Ans : (1) As the length of a pendulum increases, the frequency of oscillations decreases. That means, as the length of a pendulum increases, the number of oscillations in one second decreases. (2) The frequency of oscillations is not affected much by the amplitude of oscillations. That means, even if the amplitude is increased, the frequency does not change much, it remains nearly the same.

(d) Explain the two ways by which the pitch of the sound generated by a stretched string can be changed.

Ans : (1) When the tension in the wire is increased, the frequency increases and thus the sound produced is shriller. Also, when the tension in the wire is decreased, the frequency decreases and the sound produced is less shrill. (2) When the length of the wire is decreased, the frequency increases. Thus, the sound produced is shriller. When the length of the wire is increased, the frequency decreases and the sound produced is less shrill. Using these two ways, the pitch of the sound generated by a stretched wire can be changed.

5. Use your brain power!

(1) Will a sound be produced no matter how the ruler is kept on the table ?

Ans : A plastic ruler is placed on a table such that, its one end is on the table and the other end is off the table. Pressing the end on the table, if the other free end is pressed in downward direction till the ruler slightly bends and then the free end is released ; the vibrations produce in the ruler and sound is generated. Now, find out using your brain power, will a sound be produced no matter how the ruler is kept on

the table? If you perform the same activity by placing the ruler at different positions and distances onto the table, you will see that, sound is not produced by placing the ruler in any position. If the ruler is placed straight (or erect) on the table then the sound is not produced.

If most of the part of the ruler is on the table and only a little part is out of the table, then the vibration are not produced in the ruler and thus, the sound is not produced.

2. Is there any correlation between the length of the free part of the ruler and the sound generated ?

Ans : The length of the free part of the ruler and the sound generated are related to each other. The sound coming from the ruler changes according to the length of the free part of the ruler.

3. If the ruler is plucked while it is held with 25 cm if it off the table, does it make any sound? If there is no sound, look for the reason why it is so.

Ans : If the ruler is held with 25 cm of it off the table and is plucked, it does not produces any sound; because the frequency of vibrations produced that time would be very less. We can only here sound of particular frequency.

4. Which of the sound, the roar of a lion or the hum of a mosquito has the higher pitch ?

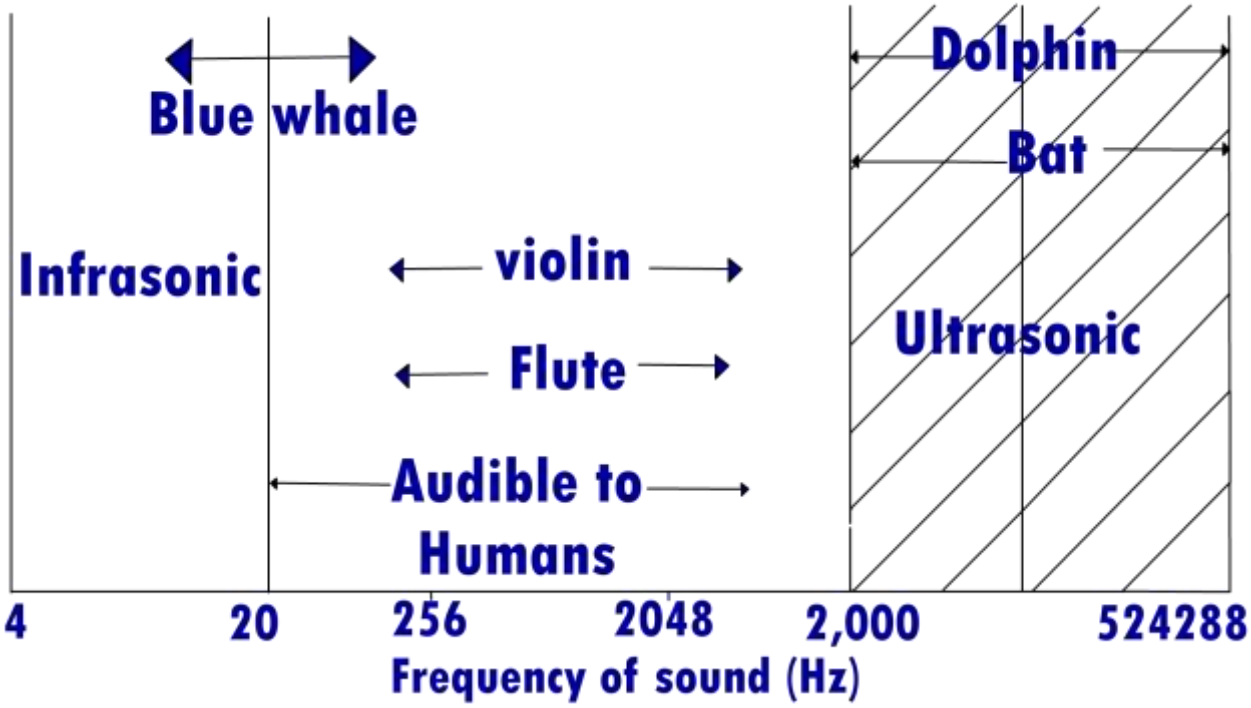
Ans : If the roar of a lion or the hum of a mosquito is compared then, the roar of a lion is loud (more intense) but is of lower pitch. On the other hand, the hum of mosquito is soft(less intense) and is of higher pitch than the roar a lion.

5. What structures in the sitar help to produce higher or lower pitched sounds ?

Ans : Sitar has two structures, one is a gourd- shaped and other is long neck. The free end at the upper side of the long neck has many nails to roll the string. Seven strings are attached from the nails to the gourd. There are membranes below these strings. The tension in the strings can be increased or decreased by adjusting the nails. With the help of these structures,

the higher and lower pitched sounds can be produced from the sitar.

Q.6 observe the following figure and answer the questions given below it :



(1) What is the frequency of sound that a blue whale can hear?

(2) What is range of sound in hertz the dolphin can hear ?

(3) What is the sound called having a frequency which a bat can hear?

(4) What is the frequency of sound (coming) that produces from violin?

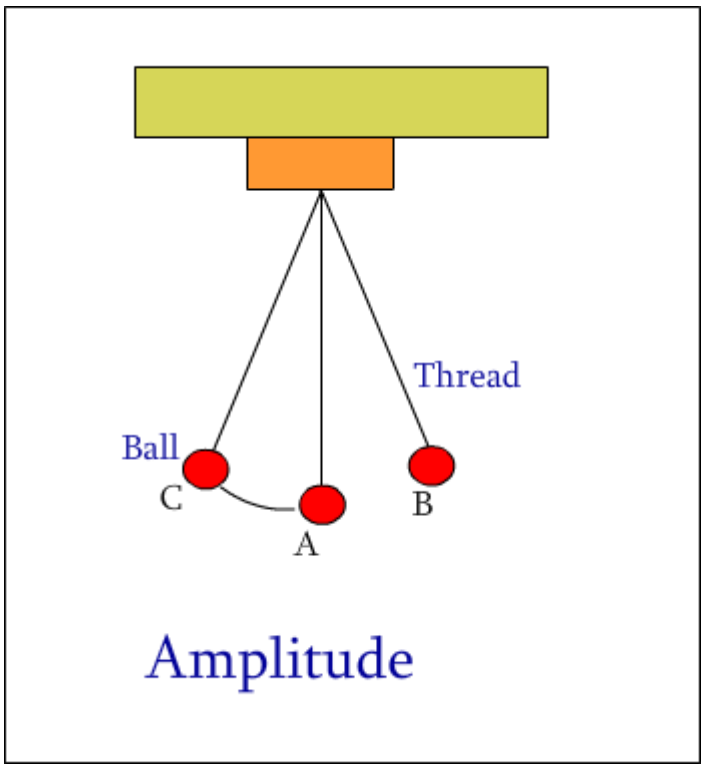
(5) In one type of vibration, 3000 oscillations are completed in one second. What is the frequency of those oscillations?

(6) 60 seconds are required to complete 30 oscillations in one type of vibration. What is the time period of those oscillations?

Ans : (1) 4 Hz to 256 Hz (2) 20000 Hz to 524288 Hz (3) Ultrasonic sound (4) 20 Hz to 20000 Hz (5) 3000 Hz (6) 2 seconds.

Q. 7 Explain what is meant by a pendulum and draw its neat diagram. In the diagram, show the central position of the pendulum and amplitude of oscillation.

Ans : Pendulum : An oscillator which is made up of a small iron or wooden ball tied to a half a meter long strong thread and the other end of the thread is tied to a fixed support such that the ball is freely suspended in the air. Such an oscillator is called a pendulum.


Thread
Ball
C
A
B
Amplitude