

29/5/20

Class 8 Physics
Chapter 7. Sound

B. Short/ long Answer Questions

Question 1. How does sound travel in air?

Answer. A periodic disturbance in the medium (air) is created by the vibration of sound and the particles of the medium vibrate about their mean position and transfer of energy in form of sound waves takes place i.e. in the longitudinal waves.

Question 2. What is a longitudinal wave?

Answer. The wave in which the particles of the medium vibrate about their mean positions in the direction of propagation of sound is called longitudinal wave. Such a wave can be produced in solids, liquids as well as gases.

Question 3. Explain the mechanism of formation of a longitudinal wave when source vibrates in air.

Answer. Propagation of sound in air
(whole topic from page 124- 125 including diagram) excluding last paragraph

Question 4. Define the following terms:

(a) Amplitude

(b) Frequency

(c) Time period

Answer. **(a) Amplitude** – The maximum displacement of a vibrating particle from its rest (or mean) position is called its amplitude. It is measured in metre.

(b) Frequency - The number of vibrations completed by a vibrating particle in one second is called its frequency. It is measured in Hertz.

(c) Time period – The time taken by a vibrating particle to complete one vibration is called its time period. It is measured in second.

Question 5. Obtain relationship between the time period and frequency.

Answer. Let T is the time period of a wave, by definition

In time T, the number of waves = 1

So in 1 second, number of waves (frequency) = $1/ T$

So frequency = $1/ \text{Time period}$

Question 6. Name three characteristics of a musical sound.

Answer. The three characteristics of a musical sound are:

Loudness, Pitch and Quality

Question 7. Which of the following determines the loudness of a sound wave?

(a) Wavelength (b) Frequency or (c) Amplitude

Answer. Amplitude

Question 8. How is loudness related to the amplitude of a wave?

Answer. Loudness \propto (Amplitude)²

Question 9. If the amplitude of a wave is doubled, what will be the effect on its loudness?

Answer. As Loudness \propto (Amplitude)²

If amplitude is doubled then the loudness becomes 4 times.

Question 10. How does the wave pattern of a loud note differ from a soft note?

Draw a diagram.

Answer. The wave pattern of a loud note has higher amplitude as compared to soft note.

Figure 7.5 Soft and loud sound Page 127

Question 11. Name the unit in which the loudness of sound is expressed.

Answer. Decibel (dB)

Question 12. Why is the loudness of sound heard by a plucked wire increased when mounted on a sound board?

Answer. When a wire mounted on a sound board is plucked, the surface area of vibrating air increases and sends greater amount of energy. So the amplitude of vibration is large and louder is the sound heard.

Question 13. State three factors on which loudness of sound heard by a listener depends?

Answer. The various factors on which loudness of sound heard by a listener depends

- are:
- i) Amplitude of wave
 - ii) Distance of source of sound
 - iii) Surface area of vibrating body
 - iv) Sensitivity of listener
 - v) Intensity of sound

Question 14. What determines the pitch of a sound?

Answer. Frequency.

Higher is the frequency higher is the pitch and lower is the frequency lower is the pitch.

Question 15. Name the characteristic of sound related to its frequency.

Answer. Pitch

Question 16. Name and define the characteristic which enables one to distinguish two sounds of same loudness, but of different frequencies, given by the same instrument.

Answer. The characteristic which enables one to distinguish two sounds of same loudness, but of different frequencies, given by the same instrument is **pitch**.

The sensation of a frequency is commonly referred to as the pitch of a sound. A high pitch sound corresponds to a high frequency and a low pitch sound refers to a low frequency sound wave.

Question 17. Draw a diagram to show the wave pattern of high pitch note and a low pitch note, but of same loudness.

Answer. Figure 7.9 Low pitch note and high pitch note Page 130

Question 18. Standing at a distance, how it is possible to detect the filling of a bucket under a water tap by hearing the sound?

Answer. Take a bucket. Keep it below a water tap. We will notice that as water level in the bucket rises, the length of air column decreases, so the frequency of sound produced increases i.e. the sound becomes shriller and shriller. Thus, by hearing the sound from a distance, one can get an idea of water level in the bucket.

Question 19. The frequencies of notes given by flute, guitar and trumpet are respectively 400 Hz, 200 Hz and 500 Hz. Which one of these has the highest pitch?

Answer. The trumpet has the highest pitch because it has the highest frequency.

Question 20. Fig. 7.20. shows two jars A and B containing water up to different heights. Which will produce sound of higher pitch when air is blown in them?

Answer. Jar B because the length of air column in jar B is less than that in jar A.

Question 21. Two identical guitars are played by two persons to give notes of same pitch. Will they differ in quality? Give reason for your answer.

Answer Yes, because they might be made of different material of wood. It can be of different length and the thickness of the strings can also be different.

Question 22. Two musical notes of the same pitch and same loudness are played on two different instruments. Their wave patterns are as shown in fig 7.21.

How do they differ in

(a) loudness (b) pitch and (c) quality?

Answer. (a) Loudness – Same as amplitude is same.

(b) Pitch – Same as frequency is same.

(c) Quality – Different because of shape and material used to make them.

Also they have different waveform.

Question 23. Which characteristic of sound makes it possible to recognize a person by his voice without seeing him?

Answer. Quality of sound

Question 24. State the factors that determine

(a) the pitch of a note

(b) the loudness of the sound heard

(c) the quality of the note

Answer. (a) frequency

(b) amplitude

(c) waveform

Question 25. Name the characteristic of the sound affected due to a change in its

(a) amplitude (b) waveform (c) frequency

Answer. (a) loudness (b) quality (c) pitch

Question 26. To be done in book only

Question 27. How is the pitch of sound in a guitar changed if

(a) thin wire is used

(b) wire under less tension is used?

Answer. (a) Pitch of the sound become shrill when wire gets thin as
pitch \propto 1/thickness.

(b) Pitch of the sound in a guitar becomes flat (grave) or low when wire under less tension is used as

pitch \propto tension

C. Numericals

1. Two waves of the same pitch have amplitudes in ratio 1:3. What will be the ratio of their (i) loudness (ii) pitch?

Answer.

(i) Given , let Amplitude of A = 1 cm

Amplitude of B = 3 cm

$$\frac{\text{Loudness of A}}{\text{Loudness of B}} = \frac{(\text{Amplitude of A})^2}{(\text{Amplitude of B})^2}$$
$$= \frac{(1)^2}{(3)^2}$$
$$= 1/9$$

(ii) Pitch 1:1 as pitch does not depends on amplitude.

2. Two waves have frequencies 256 Hz and 512 Hz, but same amplitude. Compare their (i) loudness and (ii) pitch)

Answer

(i) Loudness 1:1 as loudness does not depends on frequency.

ii)) Given , let Frequency of A = 256 Hz

Frequency of B = 512 Hz

$$\frac{\text{Pitch of A}}{\text{Pitch of B}} = \frac{(\text{Frequency of A})}{(\text{Frequency of B})}$$
$$= 256 / 512$$
$$= 1:2$$