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Solution 31
False
Solution 32
Slowest: Sound
Fastest: light
Solution 33
Supersonic is used to denote a speed greater than the speed of sound.
Solution 34
Sound travels faster in hydrogen ( speed of sound in hydrogen is 1284m/s)
Solution 35
The number 256 on tuning fork signifies the frequency of tuning fork.
Solution 36

$$\text{Frequency} = \frac{1}{\text{time period}}$$

$$\text{Frequency} = 200\text{Hz}$$

$$\text{Time period} = \frac{1}{\text{frequency}}$$

$$= \frac{1}{200} = 5 \times 10^{-3}\ \text{sec}$$

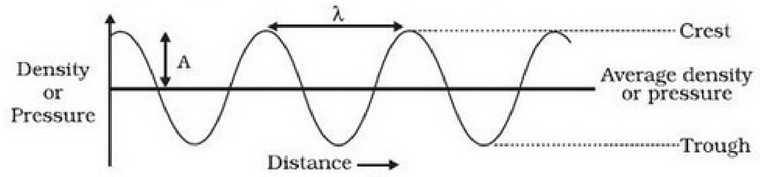
Solution 37

$$\text{Frequency} = \frac{1}{\text{time period}}$$

$$= \frac{1}{0.02} = 50\text{Hz}$$

Solution 38
Velocity of sound = Frequency x wavelength
Speed of sound in air is constant.
Hence, frequency x wavelength = constant
If frequency is doubled, wavelength is reduced to half.
Solution 39
The frequency in hertz is equal to the number of waves produced per second. In this case, 20 waves are produced per second, so the frequency of sound waves is 20 hertz.
Solution 40
(a) Vibrations
(b) Compressions; lower; rarefactions
(c) Hertz; wavelength; metres
(d) Vacuum

(e) Greater
(f) Decreases
Solution 41
Vacuum means empty space, region with no matter particles. Sound cannot travel through vacuum because vacuum has no molecules which can vibrate and carry sound waves.
Solution 42
The maximum displacement of the particles of the medium from their original undisturbed positions, when a wave passes through the medium, is called amplitude (A) of the wave.




Solution 43
(a) A wave in which the particles of the medium vibrate back and forth in the 'same direction', in which the wave is moving, is called a longitudinal wave. These waves can be produced in all the three media: solids, liquids and gases. A wave in which the particles of the medium vibrate up and down, 'at right angles' to the direction in which the wave is moving, is called a transverse wave. It can be produced in solids and liquids but not in gases.
(b) Sound is a longitudinal wave.
Solution 44
Due to the very high speed of light we see the ball hitting the bat first. And it is due to comparatively lower speed of sound that the sound of hitting is heard a little later.
Solution 45
Light travels much faster than sound. Due to this, the flash of lightning is seen first and the sound of thunder is heard a little later.
Solution 46
Light travels much faster than sound. Due to this, the flash of gun shot is seen first and the sound of gun shot is heard a little later.
Solution 47
Sound waves in air: Longitudinal, Compression, Rarefaction.
Water waves: Transverse, Crest, Trough.
Solution 48
(a) Sound can be produced by the following methods:
(i) By vibrating strings (as in a sitar),
(ii) By vibrating air (as in a flute),
(iii) By vibrating membranes (as in a drum)
(iv) By vibrating plates (as in cymbals)
(b) Speed of sound wave= frequency x wavelength

(b)Speed of sound wave= frequency x wavelength
$v = f \times \lambda$
Frequency f=2kHz= 2000Hz
Wavelength, $\lambda = 65cm$
$= 0.65$ m
Velocity, v= 2000 x 0.65=1300m/s

Solution 49
This is due to the fact that when the ringing bell is held tightly with our hand, it stops vibrating and the sound coming from it also stops.
Solution 50
Sound is produced by the following objects:
(i) Vibrating stretched strings of sitar
(ii) Vibrating stretched membranes of tabla

(iii) Vibrating prongs of a tuning fork
(iv) Vibrating wings of mosquito
(v) Vibrating air columns in flute.

Solution 51

In most of the cases, a sound producing object vibrates so fast that we cannot see its vibrations with our eyes. The time inetrval between two successive vibration is lower than the persistence of vision. Hence we see the object in static state and not in vibration mode.

Solution 52

Fill water in a beaker up to its brim. Touch the surface of water with the prongs of a sound making tuning fork (which has been struck on a hard rubber pad). The prongs of tuning fork producing sound splash water. This shows that the prongs of a sound producing tuning fork are vibrating (moving forwards and backwards rapidly).

The prongs of a sound producing tuning fork splash water, so they are vibrating.

Solution 53

The sound of a gas travels through the vibrations of air layers so it reaches first, but the smell of gas reaches the person through the actual movement of the air layers, which takes more time.

Solution 54

Frequency is number of vibrations produced per second i.e. 128 Hz.

Frequency is number of vibrations produced per second i.e. 128 Hz.
Wavelength, $\lambda = 2.7$ m
Speed of sound wave= frequency x wavelength
$v = f \times \lambda$
Velocity, v= 128 x 2.7 =345.6 m/s

Solution 55

Velocity of wave= 340m/s
Frequency= 512 Hz
Wavelength=?
Speed of sound wave=
frequency x wavelength

Velocity of wave= 340m/s
Frequency= 512 Hz
Wavelength=?
Speed of sound wave= frequency x wavelength
$v = f \times \lambda$

Hence,
$$\lambda = \frac{\text{Velocity of wave}}{\text{Frequency}} = \frac{340}{512} = 0.66\,\text{m}$$

Solution 56

The number of complete waves (or cycles) produced in one second is called frequency of the wave.
The time required to produce one complete wave (or cycle) is called time-period of the wave.
The time taken to complete one vibration is called time-period.

Relation between time-period and frequency of a wave is:

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Relation between time-period and frequency of a wave is:

$$\text{Frequency} = \frac{1}{\text{time period}}$$

Solution 57

A ringing bell suspended in a vacuum chamber cannot be heard outside because sound cannot travel through vacuum as it has no molecules which can vibrate and carry
sound waves.

Solution 58

Frequency, f=1020Hz
Velocity, v=340m/s
Wavelength =?
Speed of sound wave= frequency x wavelength

Frequency, f=1020Hz
Velocity, v=340m/s
Wavelength =?
Speed of sound wave= frequency x wavelength

$$v = f \times \lambda$$

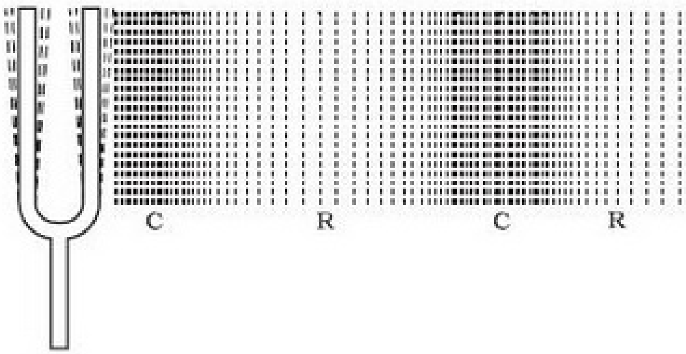
$$\lambda = \frac{\text{Velocity of wave}}{\text{Frequency}}$$

$$= \frac{340}{1020} = 0.333\,\text{m} = 33.3\,\text{cm}$$

Solution 59

A compression is that part of a longitudinal wave in which the particles of the medium are closer to one another than they normally are, and there is a momentary reduction in volume of the medium. It is a region of high pressure.

A rarefaction is that part of a longitudinal wave in which the particles of the medium are farther apart than normal, and there is a momentary increase in the volume of the medium. It is a region of low pressure.

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