PHYSICS

BOOKS - TARGET PHYSICS (MARATHI ENGLISH)

Sound

Exercise

1. Wave motion is a propagation of disturbance through the medium in terms of

_____

A. oscillation of particles

B. oscillation of energy

C. polarising effec

D. musical melody

Answer:

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2. Which of the following is not an example of mechanical waves?

A. Radio waves

B. Sound waves

C. Waves on stretched string

D. Waves on the water surface

Answer:

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3. Which of the following is NOT correct condition for the propagation of mechanical wave through a medium?

A. medium should be elastic.

B. medium should possess inertia

C. medium should possess negligible frictional resistance.

D. medium should be perfectly plastic.

Answer:

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4. Oscillator transfers _____

A. energy

B. particles

C. electric effect

D. magnetic effect

Answer:

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5. Sound is a form of energy for which

A. medium is necessary for its propagation.

B. medium is not necessary for its propagation.

C. source of sound is not necessary for its propagation.

D. vacuum is necessary for its propagation.

Answer:

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6. For propagation of sound waves medium should _____

A. elastic

B. plastic

C. denser

D. chemically ionized

Answer:

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7. Which of the following waves do not require material medium for propagation?

A. wave of string

B. light waves

C. sound waves

D. sea waves

Answer:

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8. The maximum displacement of vibrating particle from its mean position is called as _____

A. displacement

B. amplitude

C. distance covered

D. path length

Answer:

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9. Choose the correct option?

Each particle of the medium vibrates with..... amplitude

A. same

B. decreasing

C. increasing

D. unequal

A. same

B. decreasing

C. increasing

D. unequal

Answer:

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10. The distance covered by the disturbance (wave) per second is called _____

A. velocity of wave

B. velocity of particle

C. velocity of medium

D. speed of medium

Answer:

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11. When wave changes the medium,_____ the does not change

A. speed

B. wavelength

C. frequency

D. amplitude

Answer:

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12. Wave motion is periodic in _____

A. space only

B. time only

C. both space and time

D. direction

Answer:

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13. Progressive waves in a vibrating medium have same___

A. amplitude

B. period

C. frequency

D. distribution of particles

Answer:

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14. Assertion: Speed of wave = $\frac{\lambda}{Timeperiod}$

Reason: Wavelegth is the distance between two nearest particles in phase.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer:

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15. The radio station broadcasts is at wavelength of 200 m. The speed of the radio waves is $3 \times 10^8 m/s$. The frequency for tuning radio station is

A. $1.5 \times 10^8 Hz$

B. $1.5 \times 10^6 Hz$

C. $6 \times 10^6 Hz$

D. $0.7 \times 10^{-6} Hz$

Answer:

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16. The audible frequency range of human ear is 20 Hz and 20 kHz. The corresponding

wavelength range is [speed of sound in air = 340 m/s]

A. $10 \times 10^{-3} m$ to 17 m

B. $17 \times 10^{-3} m$ to 1.7 m

C. 0.17 m to 17 m

D. 17 m to 17×10^{-3}

Answer:

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17. A bat emits ultrasonic sound of frequency 100 kHz. If this sound meets a water surface what is the wavelength of the transmitted sound in air and water respectively?

A. $1.5 \times 10^{-2} m, 3.40 \times m$

B. $3.40 \times 10^{-3} m, 1.5 \times 10^{-2} m$

C. $1.5m, 3.4m$

D. 3.4 m, 1.5 m

Answer:

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18. Which of the following is the example of transverse wave?

A. Sound waves

B. Compressional waves in a spring

C. Vibration of string

D. None of these

Answer:

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19. The transverse sound waves are produced in

A. both gases and solids.

B. neither in the gases nor in the solids.

C. the gases but not in solids.

D. the solids but not in gases.

Answer:

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20. In transverse waves, particles of the medium vibrate

A. perpendicular to the direction of propagation of waves

B. parallel to the direction of propagation of waves.

C. at 30° with the direction of propagation of waves.

D. at 45° with the direction of propagation of waves.

Answer:

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21. The convex part of the transverse wave is

A. trough

B. crest

C. half distance

D. half wave length

Answer:

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22. In longitudinal waves, the region where particles are less crowded are known as

A. compression

B. condensation

C. rarefaction

D. propagation

Answer:

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23. In the formation of longitudinal wave 1st particle communicate disturbance to next particle in terms of time T (periodic time) is

A. $\frac{T}{2}$

B. $\frac{3T}{4}$

C. $\frac{T}{4}$

D. $\frac{T}{8}$

Answer:

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24. In the formatio of transverse wave, 1^{st} particle will trasfer the disturace to 6^{th} article in terms of time T (periodic time).

A. $\frac{T}{8}$

B. $\frac{3T}{8}$

C. $\frac{5T}{8}$

D. $\frac{7T}{8}$

Answer:

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25. Longitudinal wave creates _____

A. crests and troughs

B. crests and compressions

C. troughs and rarefactions

D. compressions and rarefactions

Answer:

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26. Transverse wave has following directions to observe, identify CORRECT one.

A. Wave travels along z-axis, particles of the medium travel in x-y plane

B. Wave travels along x-axis, particles of medium travel in x-z plane

C. Wave travels along z-axis, particles of the medium travel in y-z plane

D. Wave travels along x-axis, particles of the medium travel in x-y plane

Answer:

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27. For the propagation of transverse wave, the medium should possess the property of

A. Young's modulus.

B. bulk modulus

C. modulus of rigidity

D. modulus of elasticity.

Answer:

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28. When transverse waves advance through a medium

A. there is change of pressure and density at any point of the medium

B. there is no change of pressure and density at any point of the medium.

C. there is only change of pressure but not density at any point of the medium.

D. there is only change in density but not pressure.

Answer:

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29. The transverse wave can travel through _____

A. gases

B. liquids

C. fluids

D. solids

Answer:

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30. Compression is the region where particles of the medium are _____

A. far apart

B. crowded

C. equispaced

D. few

Answer:

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31. Distance between any two successive compression or rarefaction in longitudinal wave is _____

A. wave number

B. wave velocity

C. waveform

D. wavelength

Answer:

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32. When longitudinal wave advances through a medium

A. there is uniformity in pressure and density along the path of wave.

B. there is variation in pressure and density along the path of wave.

C. pressure varies but density remains uniform.

D. density varies but pressure remains uniform.

Answer:

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33. Longitudinal waves cannot be polarised because

A. direction of vibration of particles and direction of propagation of wave is same.

B. direction of vibration of particles and direction of propagation of wave is different.

C. direction of vibrations of particles remains same whereas propagation of waves is different.

D. direction of vibration of particles and direction of propagation of wave is opposite.

Answer:

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34. Choose the correct option?

During longitudinal wave motion the quantities transmitted in direction of propagation are

A. energy and mass

B. energy only

C. energy and momentum

D. energy, mass and momentum

A. energy

B. energy and mass

C. mass and momentum

D. momentum and energy

Answer:

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35. Vibrating tuning fork explains compression and rarefaction as below. Choose incorrect statement

A. Prongs of fork produce vibrations.

B. Vibrations bring prongs toward each other thereby creating rarefaction.

C. When prongs are outwards there is compression.

D. The waves generated are transverse.

Answer:

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36. The equation of a sound wave is y = 0.0015 sin (62.4x + 316 t) The wavelength of this wave is

A. 0.2 unit

B. 0.1 unit

C. 0.3 unit

D. Cannot be calculated

Answer:

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37. A wave equation which gives the displacement along y-direction is given by y = 0.001 sin (100t + x) where x and y ane in meter and t is time in second. This represented a wave

A. Of frequecy $100/\pi$ Hz

B. Of wavelength oe metre

C. Travelling with a Velocity of $50/\pi ms^{-1}$ in the positive X-direction

D. Travelling with a Velocity of $100ms^{-1}$ in the negative X-direction

Answer:

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38. The equation of the propagating wave is y = 25sin(20t + 5x), where y is displacement. Which of the following statements is not true.

A. The amplitude of the wave is 25 units

B. The wave is propagating in positive x-direction.

C. The velocity of the wave is 4 units

D. The maximum velocity of the particles is 500 units.

Answer:

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39. Sound wave propagation is NOT possible through _

A. solids

B. liquids

C. gases

D. vacuum

Answer:

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40. Newton assumed that changes taking place in a medium, when sound waves propagating through medium, are _____

A. isothermal

B. adiabatic

C. isobaric

D. isomeric

Answer:

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41. What are the factors on which velocity of sound in gaseous medium depend?

A. wavelength of sound only.

B. density and elasticity of gas.

C. intensity of sound waves only.

D. amplitude and frequency of sound.

Answer:

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42. Choose the correct option?

The.....is developed during compression according to Laplace's formula for speed of sound.

A. sound

B. light

C. heat

D. cooling

Answer:

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43. According to Newton's assumption, the temperature of the gaseous medium _____ when sound waves travel through medium.

A. decreases

B. remains constant

C. increases

D. depends on wind velocity

Answer:

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44. In the expression for velocity of sound, according to Newton, the modulus of elasticity is

A. isothermal bulk modulus and is equal to the atmospheric pressure.

B. adiabatic rigidity modulus

C. isothermal rigidity modulus and is not equal to atmospheric pressure.

D. force required for the motion of sound waves.

Answer:

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45. The error in the value of velocity of sound in air by Newton's formula and as determined by experiment at $0^\circ C$ is

A. nearly 5%

B. nearly 6%

C. nearly 16%

D. nearly 22%

Answer:

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46. Choose the correct option?

The Laplace's correction in the expression for velocity of sound given by Newton is needed because sound waves

A. are longitudinal waves.

B. are mechanical waves.

C. propagate isothermally

D. propagate adiabatically.

Answer:

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47. The ratio of specific heat of air at constant pressure (cp) to specific heat of air at constant volume (cv) is

A. γ

B. ρ

C. β

D. α

Answer:

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48. Choose the correct option?

The value of γ for air is

A. 1.31

B. 1.41

C. 1.51

D. 1.61

Answer:

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49. The correct equation for velocity of sound in a medium given by Laplace is

A. $v = \sqrt{\frac{\gamma P}{\rho}}$

B. $v = \sqrt{\frac{P}{\gamma P}}$

C. $v = \sqrt{\frac{\rho}{\gamma P}}$

D. $v = \sqrt{\frac{\rho P}{\gamma}}$

Answer:

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50. Choose the correct option?

According to Laplace, the adiabatic modulus of

elasticity for air medium is given by

A. $E = \gamma P$

B. $E = \frac{P}{\gamma}$

C. $E = \frac{\gamma}{P}$

D. $P = \gamma E$

Answer:

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51. Which of the following relation is correct for velocity of longitudinal waves?

A. $v = \sqrt{\frac{E}{\rho}}$

B. $v = \sqrt{\frac{\rho}{E}}$

C. $v\sqrt{\rho E}$

D. $v = \sqrt{\rho - E}$

Answer:

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52. Velocity of transverse wave travelling through a string having tension 25 N and linear density 1 kg/m is

A. 5 m/s

B. 25 m/s

C. 125 m/s

D. lOOm/s

Answer:

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53. If the velocity of sound wave in a medium of density 2200 kg/m^3 is $4km/s$. The modulus of elasticity of the medium is

A. $5.5 \times 10^8 . . m^2$

B. $8.8 \times 10^{10}/m^2$

C. $3.52 \times 10^{10}/m^2$

D. $6.25 \times \frac{10^{10}}{m^2}$

Answer:

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54. At NTP, velocity of sound in air at $0^\circ C$ by Newton's formula is

A. $269.9m/s$

B. $279.9m/s$

C. $289.9m/s$

D. $299.9m/s$

Answer:

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55. The velocity of sound in air at $0^\circ C$ is $[\rho = 1.29 kgm^{-3}$ lambda=1.36 , $density of mercury = 13000$ kg//m^3 , $g = 9.8 m/s^2]$.

A. $336.8 m/s$

B. $319.5 m/s$

C. $316.8 m/s$

D. $306.8 m/s$

Answer:

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56. With the rise of temperature, the speed of sound in a gas

A. may increase or decrease depending upon pressure.

B. decreases only.

C. remains constant.

D. increases only.

Answer:

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57. The velocity of sound at $0^\circ C$ is vo. What will be its velocity at $27^\circ C$?

A. $1.05v_0$

B. $2.05v_0$

C. $3.05v_0$

D. $4.05v_0$

Answer:

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58. The speed of sound is NOT affected by

A. temperature of medium.

B. pressure of medium

C. moisture of medium.

D. density of medium

Answer:

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59. The speed of sound in air increases by _____ when, the temperature of medium is increased by 10°.

A. $610 m/s$

B. $6.1 m/s$

C. $61 m/s$

D. $0.61 m/s$

Answer:

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60. v_m and v_d are the velocities of sound in humid air and dry air respectively. The relation between them is

A. $v_m > v_d$

B. $v_m < v_d$

C. $v_m = v_d$

D. $v_m = \frac{v_d}{2}$

Answer:

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61. Under similar conditions of temperature and pressure, in which of the gases the speed of sound will be the greatest?

A. Carbon dioxide

B. Oxygen

C. Helium

D. Hydrogen

Answer:

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62. The superposition is the characteristic of

A. wave motion.

B. particle motion.

C. wave and particle motion.

D. neither wave nor particle motion.

Answer:

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63. The energy in the superposition of waves

A. is lost.

B. increases.

C. remains same, only redistribution occurs.

D. may increase or decrease depending upon the medium.

Answer:

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64. To hear an echo, the total distance covered by sound from the point of generation to the reflecting surface and back should be atleast _____

A. 36 m

B. 17.2 m

C. 34.4 m

D. 19 m

Answer:

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65. A note is ____

A. pure sine vibration

B. pure tan vibration

C. straight motion

D. irregular disturbance

Answer:

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66. Loudness of the sound depends upon

A. square of the amplitude.

B. amplitude.

C. reciprocal of the amplitude.

D. square root of the amplitude

Answer:

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67. Loudness can be increased by

A. increasing distance

B. resonance.

C. decreasing intensity

D. increasing amplitude.

Answer:

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68. Every musical sound can be regarded as combination of _____

A. nodes

B. antinodes

C. notes

D. noises

Answer:

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69. Quality of a musical note depends on

A. harmonics present

B. length of the wave.

C. velocity of sound in the medium.

D. fundamental frequency.

Answer:

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70. Pitch of a note depends upon_____

A. fundamental frequency

B. harmonics

C. source

D. amplitude

Answer:

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71. The apparent change in frequency of a sounding source and observer in relative motion is

A. phenomenon of beats.

B. Doppler effect.

C. stationary waves

D. resonance.

Answer:

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72. Doppler effect is not applicable

A. when the source and observer both are at rest

B. when there is relative motion between source and observer.

C. when source is at rest and observer is moving

D. when source is moving and observer is at rest

Answer:

73. If the distance between the observer and source decreases with time, then it shows that

A. apparent frequency will be less than actual frequency.

B. apparent frequency will be greater than actual frequency.

C. pparent frequency will be equal to the actual frequency.

D. apparent frequencies cannot be noticed.

Answer:

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74. A boy moves away from a steady source of sound at a constant speed. The sound he hears will

A. decrease in frequency and intensity.

B. increase in frequency and intensity.

C. decrease in frequency and increase in intensity

D. increase in frequency and decrease in intensity.

Answer:

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75. Assertion: The whistle of an approaching engine appears to be shriller than that of a receding engine.

Reason: This is due to Doppler effect, which states that if a source of sound approaches

the observer, the frequency of sound increases and if the source recedes the observer, the frequency of sound decreases.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False but, Reason is True.

Answer:

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76. Assertion: There will be no Doppler effect, when both the source and listener are at rest and wind alone is blowing.

Reason: The blowing wind does not change the distance between the source and listener, which is a must for Doppler effect

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False but, Reason is True.

Answer:

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77. Doppler's effect for light differs from Doppler's effect for sound, because

A. The velocity addition is valid for the sound waves but same is not true for the light waves.

B. Velocity of light is greater whereas it is lesser for sound

C. Light can travel in vacuum while sound cannot.

D. The shift in frequency for light is lesser than that for sound.

Answer:

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78. A source of sound when moves towards a stationary observer, then frequency of the sound heard by listener is more than actual frequency because the

A. velocity of sound increases

B. apparent wavelength of sound decreases.

C. velocity and apparent wavelength of sound increases.

D. apparent wavelength of sound increases.

Answer:

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79. An observer is standing on a railway platfonn. He hears the whistle of a railway engine moving towards him and then passing. He feels that

A. the frequency appears to increase and then decrease

B. the frequency appears to decrease continuously.

C. the frequency appears to increase continuously.

D. the pitch does not change.

Answer:

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80. A source of sound and a listener are both moving in the same direction, the source following the listener. If the respective velocities of sound, source and listener are v, v_s and v_l , then the ratio of the actual frequency of the source and the apparent frequency as received by the listener is

A. $\frac{v - v_l}{v - v_s}$

B. $\frac{v - v_s}{v - v_l}$

C. $\frac{v + v_l}{v + v_s}$

D. $\frac{v + v_s}{v + v_l}$

Answer:

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81. The property that distinguishes longitudinal waves from transverse waves is that

A. longitudinal waves carry energy.

B. particles of longitudinal waves oscillate.

C. longitudinal waves cannot be polarised

D. longitudinal waves pass through solids.

Answer:

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82. A hospital uses an ultrasonic scanner to locate tumours in a tissue. The operating frequency of the scanner is 4.2 MHz. The speed of sound in a tissue is $1.7kms^{-1}$. The wavelength of the sound in the tissue is close to

A. $4 \times 10^{-4}m$

B. $8 \times 10^{-4} m$

C. $4 \times 10^{-3} m$

D. $8 \times 10^{-3} m$

Answer:

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83. Choose the correct option?

A source of frequency 500 Hz produces waves. If wavelength is 0.1 m, the waves travel a distance of 300 m in

A. 7.2 s

B. 6 s

C. 3.6 s

D. 0.6 s

Answer:

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84. Choose the correct option?

A tuning fork vibrates and produces concentric circular transverse waves on the

surface of water. If distance between 10 crests is 9.0 m and velocity of wave on the surface of water is 450 m/s, then frequency of the tuning fork is

A. 500 Hz

B. 250 Hz

C. 225 Hz

D. 450 Hz

A. 500 Hz

B. 450 Hz

C. 250 Hz

D. 2250Hz

Answer:

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85. Loudness of the sound does not depend upon _____

A. density of air

B. velocity and direction of wind

C. temperature of surrounding

D. distance

Answer:

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86. The temperature at which the velocity of sound in air will be 1.5 times its velocity at $0^\circ C$ is

A. $614.2^\circ C$

B. $514.4^\circ C$

C. $341.2^{\circ} C$

D. $241.4^{\circ} C$

Answer:

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87. Human ear cannot hear those mechanical waves whose frequency lies in the frequency range

A. less than 100Hz but greater than 10000 Hz

B. between 1000 Hz and 500 Hz

C. between 500 Hz and 20000 Hz

D. less than 16 Hz and more than 20000 Hz.

Answer:

88. In oscillatory motion, particles of the medium perform____

A. rotational motion

B. translational motion

C. vibratory motion

D. irregular motion

Answer:

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89. For a wave which of the following statement is true?

A. Energy is transferred and not the matter

B. Energy is not transferred, but matter is transferred.

C. Energy and matter both are transferred.

D. Neither energy nor matter is transferred.

Answer:

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90. In case of sound waves, amplitude means

A. maximum displacement from mean position

B. minimum displacement from mean position.

C. sound distribution.

D. distance covered in unit time.

Answer:

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91. Which of the following is NOT the characteristic of the progressive wave?

A. All the vibrating particles of medium have different amplitudes and frequency.

B. State of oscillation changes from particle to particle

C. For its propagation, medium should have elasticity and inertia.

D. The form of wave repeats itself at equal intervals.

Answer:

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92. A tuning fork produces waves in a medium. If the temperature of the medium changes, then which of the following will change?

A. Amplitude

B. Frequency

C. Wavelength

D. Time-period

Answer:

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93. The frequency of a sound wave is n and its velocity is v. If the frequency is increased to 4n, the velocity of the wave will be

A. v

B. 2v

C. 4v

D. $\frac{v}{4}$

Answer:

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94. In a sinusoidal wave, the time required for a particular point to move from maximum

displacement to zero displacement is 0.14 second. The frequency of the wave is

A. 0.42 Hz

B. 2.75 Hz

C. 1 .79 Hz

D. 0 56 Hz

Answer:

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95. An observer standing at the sea-coast, observes 48 waves reaching the coast per minute. If the wavelength of each wave is 10 m, then the velocity of the wave is

A. $5m/s$

B. $8m/s$

C. $10m/s$

D. $16m/s$

Answer:

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96. The following figure shows the shape of part of a long string in which transverse waves are produced by attaching one end of the string to tuning fork of frequency 250 Hz. The velocity of the waves is

A. $1.0ms^{-1}$

B. $1.5ms^{-1}$

C. $2.0ms^{-1}$

D. $2.5ms^{-1}$

Answer:

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97. The distance between a crest and its nearest trough is 2.5 cm. If 4 complete waves pass through any point per second, then the velocity of wave, in cm/s, will be

A. 20

B. 35

C. 50

D. $6.25 \times \frac{10^{10}}{m^2}$

Answer:

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98. The tuning forks of frequencies 320 Hz and 340 Hz produce sound waves of wavelength differing by 6 cm in air. The velocity of sound in air is

A. $426.4 m / s$

B. $326.4 m / s$

C. $300 m / s$

D. $250 m / s$

Answer:

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99. Choose the WRONG statement

A. Waves are called progressive wave, if they travel in same straight line.

B. Waves are called progressive wave, if they travel without change of form.

C. Waves are called progressive wave, if they travel in positive direction.

D. Waves are called progressive wave, if they are not transverse or longitudinal.

Answer:

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100. Progressive wave with doubly periodic means

A. the wave which repeats itself at equal distance in equal interval of time.

B. repetition at equal distance.

C. repetition after equal interval of time.

D. repetition in medium without inertia.

Answer:

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101. A tuning fork makes 256 vibrations per second in air. When velocity of sound is $330m/s$, then wavelength of the tone emitted is

A. 0.56 m

B. 0.89 m

C. 1.11m

D. 1.29 m

Answer:

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102. The minimum audible wavelength at room temperature is about

A. $0.2\overset{\circ}{A}$

B. $5\overset{\circ}{A}$

C. 5 cm to 2 metre

D. 20 mm

Answer:

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103. Find the frequency of minimum distance between compression and rarefaction of a wire. If the length of the wire is lm and velocity of sound in air is $360m/s$

A. $90s^{-1}$

B. $180s^{-1}$

C. $120s^{-1}$

D. $360s^{-1}$

Answer:

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104. A man sets his watch by a whistle that is 2 km away. How much will his watch be in error (speed of sound in air $330m/s$) ?

A. 3 seconds fast

B. 3 seconds slow

C. 6 seconds fast

D. 6 seconds slow

Answer:

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105. The frequency of a tuning fork is 384 per second and velocity of sound in air is $352m/s$. How far the sound has traversed while fork completes 36 vibration?

A. 3 m

B. 13 m

C. 23 m

D. 33 m

Answer:

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106. When a stone is dropped on the surface of the still water, the waves produced are

_____

A. transverse

B. longitudinal

C. stationary

D. none of these

Answer:

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107. Transverse waves cannot propagate through liquids and gases because

A. liquids and gases have low density.

B. gases can flow.

C. gases are compressible.

D. liquids and gases do not have modulus of rigidity of shape.

Answer:

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108. For a transverse wave, the distance between two successive crests is 2 m. If 4 troughs cross a given point along the direction of travel in 20 s, the distance between a crest and trough is

A. 0.2 m

B. 1 m

C. 8 m

D. 10 m

Answer:

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109. A medium can carry a longitudinal wave because it has the property of _____

A. compressibility

B. elasticity

C. mass

D. density

Answer:

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110. A wave travelling along the x-axis is described by the equation y(x, t) = 0.005 cos ($\alpha x - \beta t$). If the wavelength and the time period of the wave are 0.08 m and 2.0 s, respectively, then a and p in appropriate units are

A. $\alpha = \frac{0.08}{\pi}, \beta = \frac{2.0}{\pi}$

B. $\alpha = \frac{0.04}{\pi}, \beta = \frac{1.0}{\pi}$

C. $\alpha = 12.50\pi, \beta = \frac{\pi}{2.0}$

D. $\alpha = 25.00\pi, \beta = \pi$

Answer:

Watch Video Solution

111. A wave travels in a medium according to the equation of displacement given by y(x, t) = 0.03 sin π where y and x are in metres and t in seconds. The wavelength of the wave is

A. 200 m

B. 100 m

C. 20 m

D. 10 m

Answer:

Watch Video Solution

112. Which of the following represents a wave

A. $Y = A(\omega t - kx)$

B. $Y = A \sin \omega t$

C. $Y = A\cos kx$

D. $Y = A\sin(\alpha t - bx + c)$

Answer:

Watch Video Solution

113. Which of the following is NOT the correct formula representing velocity of sound?

A. $v = \sqrt{\frac{\lambda P}{\rho}}$

B. $v = \sqrt{\frac{\lambda RT}{M}}$

C. $v = \sqrt{\frac{\lambda PV}{M}}$

D. $v = \sqrt{\frac{\lambda P}{M}}$

Answer:

Watch Video Solution

114. Assertion: The basic of Laplace correction was that, exchange of heat between the region of compression and rarefaction in air is not possible.

Reason: Air is a bad conductor of heat and velocity of sound in air is large.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer:

 Watch Video Solution

115. Assertion: The change in air pressure affects the speed of sound.

Reason: The speed of sound in gases is proportional to the square of pressure.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer:

Watch Video Solution

116. At a given temperature, the ratio of the velocity of sound in helium gas to that in nitrogen gas is

A. $\left(\frac{\sqrt{21}}{5}\right):1$

B. $5:\left(\sqrt{3}\right)$

C. $\sqrt{7}:1$

D. $\sqrt{8}:1$

Answer:

Watch Video Solution

117. A uniform wire of length 20 m and weighing 5 kg hangs vertically. The speed of transverse wave in the middle of the wire is $\left(g = 10m/s^2\right)$

A. $10m/s$

B. $10\sqrt{2}m/s$

C. $4m/s$

D. zero

Answer:

Watch Video Solution

118. A string of 5.5 m length has a mass of 0.035 kg. If the tension in the string is 77 N then the speed of a wave on the string is

A. $77m/s$

B. $102m/s$

C. $110m/s$

D. $164m/s$

Answer:

Watch Video Solution

119. The speed of a transverse wave, on a string of density $100kg/m^3$ and area of cross-section $10mm^2$ under a tension of 10^3 N, is`

A. $100m/s$

B. $1000m/s$

C. $200m/s$

D. $2000m/s$

Answer:

Watch Video Solution

120. Transverse waves are generated in two uniform wires A and B of the same material by attaching their free ends to a vibrating source

of frequency 200 Hz. The cross section of A is twice that of B. The ratio of wavelength of the transverse waves in A and B is

A. $1:\sqrt{2}$

B. $\sqrt{2}:1$

C. $1:2$

D. $2:1$

Answer:

Watch Video Solution

121. In a given string, tension T is observed to equate to Kx, where x is the extension in the string due to tension. The speed of sound wave in a stretched string is v. If the extension in a string is increased to 1.5 x, then the speed of sound wave will be (Assume linear density does not change)

A. 1.22 v

B. 0.61 v

C. 1.5 v

D. 0.75 v

Answer:

Watch Video Solution

122. The ratio of the speed of sound in hydrogen gas $\left(\lambda = \frac{7}{5}\right)$ to helium gas $\left(\lambda = \frac{5}{3}\right)$ at same temperature is

A. $\frac{\sqrt{34}}{5}$

B. $\frac{\sqrt{7}}{5}$

C. $\frac{\sqrt{42}}{5}$

D. $\frac{\sqrt{21}}{5}$

Answer:

Watch Video Solution

123. The temperature at which the speed of sound in air becomes double of its value at $27^\circ C$ is

A. $-123^\circ C$

B. $54^\circ C$

C. $327^\circ C$

D. $927^\circ C$

Answer:

Watch Video Solution

124. If at same temperature and pressure, the densities for two diatomic gases are respectively ρ_1 and ρ_2, then the ratio of velocities of sound in these gases will be

A. $\sqrt{\frac{\rho_2}{\rho_1}}$

B. $\sqrt{\frac{\rho_1}{\rho_2}}$

C. $\rho_1\rho_2$

D. $\sqrt{\rho_1\rho_2}$

Answer:

Watch Video Solution

125. The velocity of sound is v_s in air. If the density of air is increased to 4 times, then the new velocity of sound will be

A. $\frac{v_s}{2}$

B. $\frac{v_s}{12}$

C. $12v_s$

D. $\frac{3}{2}v_s^2$

Answer:

Watch Video Solution

126. v_1 and v_2 are the velocities of sound at the same temperature in two monoatomic gases of densities ρ_1 and ρ_2 respectively. If

$p_1 / p_2 = \frac{1}{4}$ then the ratio of velocities v_1 and v_2 will be

A. $1:2$

B. $4:1$

C. $2:1$

D. $1:4$

Answer:

Watch Video Solution

127. Find the temperature at which the velocity of sound in air will be double its velocity at $0^\circ C$

A. 273 K

B. 546 K

C. 1092 K

D. 0 K

Answer:

Watch Video Solution

128. When the temperature of an ideal gas is increased by 600 K, the velocity of sound in the gas becomes $\sqrt{3}$ times the initial velocity in it. The initial temperature of the gas is

A. $-73^\circ C$

B. $27^\circ C$

C. $127^\circ C$

D. $327^\circ C$

Answer:

Watch Video Solution

129. Two monoatomic ideal gases 1 and 2 of molecular masses M_1 and M_2 respectively are enclosed in separate containers kept at the same temperature. The ratio of the speed of sound in gas 1 to that in gas 2 is given by

A. $\sqrt{\frac{M_1}{M_2}}$

B. $\sqrt{\frac{M_2}{M_1}}$

C. $\frac{M_1}{M_2}$

D. $\frac{M_2}{M_1}$

Answer:

Watch Video Solution

130. The ratio of densities of nitrogen and oxygen is 14:16. The temperature at which the speed of sound in nitrogen will be same as that in oxygen at $55^\circ C$ is

A. $35^\circ C$

B. $48^\circ C$

C. $65^\circ C$

D. $14^{\circ} C$

Answer:

Watch Video Solution

131. Velocity of sound measured in hydrogen and oxygen gas at a given temperature will be in the ratio

A. $1:4$

B. $4:1$

C. $2:1$

D. $1:1$

Answer:

Watch Video Solution

132. The ratio of the speed of sound in nitrogen gas to that in helium gas, at 300 K is

A. $\sqrt{2/7}$

B. $\sqrt{1/7}$

C. $\sqrt{3}/5$

D. $\sqrt{6}/5$

Answer:

Watch Video Solution

133. Two waves of same amplitude superimpose to produce two beats per second. What is the ratio of minimum loudness to that of one of the waves?

A. ∞

B. 0

C. 1

D. -1

Answer:

Watch Video Solution

134. A stringed instrument is provided with hollow boxes. This helps to increase loudness of sound by_____

A. setting string into natural vibrations

B. setting string into forced vibrations

C. setting hollow boxes into natural vibrations along with the stringes

D. setting hollow boxes into forced vibrations along with the stringes

Answer:

Watch Video Solution

135. The loudness and pitch of a sound depends on

A. intensity and velocity.

B. frequency and velocity.

C. intensity and frequency.

D. frequency and number of harmonics.

Answer:

136. Each of the properties of sound listed in column A primarily depends on one of the quantities in column B. Choose the matching pairs from two columns

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137. Two identical sounds A and B reach a point in the same phase. The resultant sound is C. The loudness of C is n dB higher than the loudness of A. The value of n is

A. 2

B. 3

C. 4

D. 6

Answer:

 Watch Video Solution

138. The ratio of intensities between two coherent sound sources is 4 : 1. The difference of loudness in decibles (dB) between

maximum and minimum intensities, on their interference in space is

A. 20 log 2

B. 10 log 2

C. 20 log 3

D. 10 log 3

Answer:

 Watch Video Solution

139. A person is standing on a railway platform. An engine blowing a whistle of frequency 640 Hz approaches him with a speed of $72km/hr$. The frequency of the note heard by the person is (velocity of sound is $340m/s$)

A. 650 Hz

B. 660 Hz

C. 675 Hz

D. 680 Hz

Answer:

Watch Video Solution

140. Two aeroplanes A and B, each moving with a speed of 720 km/hour, are moving directly away from each other. Aeroplane A emits a whistle of frequency 1080 Hz. The apparent frequency heard by a person in plane B will be (velocity of sound in air = $340 m / s$)

A. 200 Hz

B. 260 Hz

C. 280 Hz

D. 300 Hz

Answer:

Watch Video Solution

141. An engine blowing a whistle of frequency 133 Hz moves with a velocity of $60ms^{-1}$ owards a hill from which an echo is heard. The

frequency of the echo heard by the driver (Velocity of sound in air=340 ms^(-1)`)

A. $190Hz$

B. 161 Hz

C. 133 Hz

D. 113 Hz

Answer:

Watch Video Solution

142. A passenger is sitting in a fast moving train. The engine of the train blows a whistle of frequency ‘n\ If the apparent frequency of sound heard by the passenger is n', then

A. $n' < n$

B. $n' > n$

C. $n' = n$

D. $n' \geq n$

Answer:

Watch Video Solution

Watch Video Solution

143. A source of sound and a listener are both moving in the same direction, the source following the listener. If the respective velocities of sound, source and listener are v, v_s and v_l , then the ratio of the actual frequency of the source and the apparent frequency as received by the listener is

A. $\frac{v - v_l}{v - v_s}$

B. $\frac{v - v_s}{v - v_l}$

C. $\frac{v + v_l}{v + v_s}$

D. $\frac{v + v_s}{v + v_l}$

Answer:

Watch Video Solution

144. If a stationary observer notes a change of 25% in the frequency of a whistle of an engine coming towards him, then the velocity of the engine is (velocity of sound = $332 m / s$)

A. $66.4m/s$

B. $64m/s$

C. $60km/hr$

D. $32km/hr$

Answer:

Watch Video Solution

145. A train A is travelling at a speed of $108kmhr^{-1}$. The train approaches another train B standing on the platform. The engine

of the train B blows its hom. The frequency of the horn as observed by the driver in train A is 504 Hz. The frequency of the hom of train B is (speed of sound = $330ms^{-1}$)

A. 504 Hz

B. 462 Hz

C. 550 Hz

D. 407 Hz

Answer:

Watch Video Solution

146. Two cars are approaching each other with same speed of $20m/s$. A man in car A fires bullets at regular intervals of 10 seconds. What will be the time interval noted by a man in car B between 2 bullets?

(Velocity of sound $340m/s$)

A. 11.1

B. 10 s

C. 8.9 s

D. 12 s

Answer:

Watch Video Solution

147. An engine is moving on a circular track with a constant speed. It is blowing a whistle of frequency 500 Hz. The frequency received by an observer standing stationary at the centre of the track is

A. 500 Hz

B. more than 500 Hz

C. less than 500 Hz

D. more or less than 500 Hz depending on the actual speed of the engine

Answer:

Watch Video Solution

148. An engine driver moving towards a wall with a velocity of $60m/s$ emits a note of 1400 Hz. Speed of sound in air is $340m/s$. The

frequency of the note after reflection from the wall as heard by the engine driver is

A. 1600 Hz

B. 1200 Hz

C. 1000 Hz

D. 2000 Hz

Answer:

149. An object producing a pitch of 600 Hz approaches a stationary person in a straight line with a velocity of $200m/s$. Velocity of sound is $300m/s$. The person will note a change in frequency, as the object flies past him, equal to

A. 1440 Hz

B. 240 Hz

C. 1200 Hz

D. 960 Hz

Answer:

Watch Video Solution

150. When both source and listener approach each other with a velocity equal to half the velocity of sound, the change in frequency of the sound as detected by the listener is

A. 3

B. 1

C. 1.5

D. 2

Answer:

Watch Video Solution

151. The difference between the apparent frequency 71. of a source of sound as perceived by the observer during its approach and recession is 2% of the frequency of the source. If the speed of sound in air is $300ms^{-1}$, then the velocity of the source is

A. $1.5ms^{-1}$

B. $12ms^{-1}$

C. $6ms^{-1}$

D. $3ms^{-1}$

Answer:

Watch Video Solution

152. If sound velocity is v, velocity of observer is v_0 and velocity of source is v_s, then necessary

condition for Doppler's effect to be observed is

A. $v_s \leq v, v_0 \leq v$

B. $v_s > v, v_0 > v$

C. $v_s < v, v_0 \leq v$

D. $vs < v, v_0 < v$

Answer:

Watch Video Solution

153. Consider a source of sound S and an observer P. The frequency of sound source is n_0. The frequency heard by P is found to be

(1) n_1 if P approaches S at speed v and S is stationary.

(2) n_2 if S approaches P at speed v and P is stationary.

(3) n_3 if each of P and S have speed $v/2$ towards one another. Now,

A. $n_1 = n_2 = n_3$

B. $n_1 > n_2$

C. $n_3 < n_0$

D. n_3 lies between n_1 and n_2

Answer:

Watch Video Solution

154. A car is travelling with a velocity of $40m/s$ towards a source of sound of frequency 1000 Hz. If sound velocity is $330m/s$, then apparent frequency heard by the observer (in Hz) is

A. 1121

B. 878

C. 1400

D. 1200

Answer:

Watch Video Solution

155. What should be the velocity of sound from a source w.r.t. an observer, so that the

frequency listened by the observer becomes half of the initial frequency?

A. $v/2$

B. 2v

C. $v/4$

D. v

Answer:

Watch Video Solution

156. The frequency of a whistle of the engine of an express train moving with 20 m/s appears as 500 Hz to a car driver moving with the velocity 15 m/s. The velocity of the sound in air is 335 m/s. If the train and car are moving in opposite directions towards each other, then the frequency of the whistle is

A. 557.9 Hz

B. 563.4 Hz

C. 450 Hz

D. 443.6 Hz

Answer:

Watch Video Solution

157. Two cars are moving on two perpendicular roads towards a crossing with uniform speeds of 72 km/hr and 36 km/hr. If first car blows horn of frequency 280 Hz, then the frequency of horn heard by the driver of second car

when line joining the cars make 45° angle with the roads will be

A. 321 Hz

B. 298 Hz

C. 289 Hz

D. 280 Hz

Answer:

Watch Video Solution

158. An observer starts moving with uniform acceleration ‘a’ towards a stationary sound source emitting a whistle of frequency ‘n\ As the observer approaches source, the apparent frequency heard by the observer varies with time as

A. 

B. 

C. 

D. 

Answer:

Watch Video Solution

159. The frequency of a note emitted by a source changes by 20% as it approaches the observer. As it recedes away from him, the apparent frequency will be different from the actual frequency by

A. 20%.

B. 17.4%.

C. 16.67%.

D. 14.3%.

Answer:

Watch Video Solution

160. A source of sound is travelling towards a stationary observer. The frequency of sound heard by the observer is of three times the original frequency. The velocity of sound is v m/s. The speed of source will be

A. $\frac{2}{3}v$

B. v

C. $\frac{3}{2}v$

D. 3v

Answer:

Watch Video Solution

161. A man is watching two trains, one leaving and the other coming in with equal speeds of $4m/s$. If they sound their whistles, each of

frequency 240 Hz, the number of beats heard by the man (velocity of sound in air = $320 m / s$) will be equal to

A. 6

B. 3

C. 0

D. 12

Answer:

Watch Video Solution

162. A police car moving at $22m/s$, chases a motorcyclist. The police man sounds his horn at 176 Hz while both of them move towards a stationary siren of frequency 165 Hz. Calculate the speed of the motorcycle, if it is given that he does not observe any beats.

A. $33m/s$

B. $22m/s$

C. zero

D. $11m/s$

Answer:

Watch Video Solution

163. An observer moves towards a stationary source of sound with a speed $1/5^{th}$ of the speed of sound. The wavelength and frequency of the source emitted are X and f respectively. The apparent frequency and wavelength recorded by the observer are respectively

A. $1.2f, \lambda$

B. $f, 1.2\lambda$

C. $0.8f, 0.8\lambda$

D. $1.2f, 1.2\lambda$

Answer:

Watch Video Solution

164. The number of waves contained in unit length of the medium is called

A. elastic wave.

B. wave number.

C. wave pulse.

D. electromagnetic wave.

Answer:

Watch Video Solution

165. An observer standing at the sea coast observes 54 waves reaching the coast every

minute. If the wave number is $10/metre$, the wave velocity is

A. $11.1m/s$

B. $10m/s$

C. $9m/s$

D. $6m/s$

Answer:

Watch Video Solution

166. The propagation of sound waves is not possible in space because

A. the frequency of sound is more in space.

B. there is vacuum in space.

C. the astronomical bodies block the sound in space.

D. the sound is not reflected in space.

Answer:

 Watch Video Solution

167. In an orchestra, the musical sounds of different instruments are distinguished from one another by which of the following characteristics?

A. Pitch

B. Loudness

C. Quality

D. Overtones

Answer:

Watch Video Solution

168. A stone is dropped into a lake from a tower 500 metre high. The sound of the splash will be heard by the man approximately after

A. 11.5 seconds

B. 21 seconds

C. 10 seconds

D. 14 seconds

Answer:

Watch Video Solution

169. Consider the following

I. Waves created on the surfaces of a water pond by a vibrating source. II. Wave created by an oscillating electric field in air. III. Sound waves travelling under water. Which of these can be polarized?

A. I and II

B. II only

C. II and III

D. I, II and III MX '

Answer:

Watch Video Solution

170. An earthquake generates both transverse (S) and longitudinal (P) sound waves in the earth. The speed of S waves is about $4.5km/s$ and that of P waves is about 8.0 km/s. A seismograph records P and S waves from an earthquake. The first P wave arrives 4.0 min

before the first S wave. The epicenter of the earthquake is located at distance about

A. 25 km

B. 250 km

C. 2500 km

D. 5000 km

Answer:

Watch Video Solution

171. A light pointer fixed to one prong of a tuning fork touches a vertical plate. The fork is set vibrating and the plate is allowed to fall freely. If eight oscillations are counted when the plate falls through 10 cm, the frequency of the tuning fork is

A. 360 Hz

B. 280 Hz

C. 560 Hz

D. 56 Hz

Answer:

Watch Video Solution

172. It is possible to distinguish between the transverse and longitudinal waves by studying the property of

A. Interference

B. Diffraction

C. Reflection

D. Polarisation

Answer:

Watch Video Solution

173. When an aeroplane attains a speed higher than the velocity of sound in air, a loud bang is heard. This is because

A. it explodes.

B. it produces a shock wave which is received as the bang.

C. its wings vibrate so violently that the bang is heard.

D. the normal engine noises undergo a Doppler shift to generate the bang.

Answer:

Watch Video Solution

174. It takes 2.0 seconds for a sound wave to travel between two fixed points when the day temperature is $10^{\circ} C$. If the temperature rises

to $30^{\circ}C$, the sound wave travels between the same fixed parts in

A. 1.9 s

B. 2.0 s

C. 2.1s

D. 2.2 s

Answer:

Watch Video Solution

175. Oxygen is 16 times heavier than hydrogen. Equal volumes of hydrogen and oxygen are mixed. The ratio of speed of sound in the mixture to that in hydrogen is

A. $\sqrt{\frac{1}{8}}$

B. $\sqrt{\frac{32}{17}}$

C. $\sqrt{8}$

D. $\sqrt{\frac{2}{17}}$

Answer:

Watch Video Solution

Watch video solution

176. A string of mass 2.5 kg is under a tension of 200 N The length of the stretched string is 20 m. If the transverse jerk is struck at one end of the string, the disturbance will reach the other end in

A. 1 s

B. 0.5 s

C. 2S

D. data given is insufficient

Answer:

Watch Video Solution

177. Water waves produced by a motor boat sailing in water are

A. neither longitudinal nor transverse

B. both, longitudinal and transverse.

C. only longitudinal.

D. only transverse.

Answer:

Watch Video Solution

178. A man standing between two cliffs claps his hands and starts hearing series of echoes at interval of one second. Since the speed of sound in air is $340 m / s$, the distance between cliffs must be

A. 1020 m

B. 680 m

C. 170 m

D. 34 m

Answer:

Watch Video Solution

179. When we hear a sound, we can identify its source from _____.

A. amplitude of sound

B. intensity of sound

C. wavelength of sound

D. overtones present in the sound

Answer:

Watch Video Solution

180. Choose the correct option?

The distance between two consecutive crests in a wave train produced in a string is 5 cm. If 2 complete waves pass through any point per second, the velocity of the wave is

A. 10 cm / s

B. 2.5 cm / s

C. 5 cm / s

D. 15 cm / s

A. $2.5 cm s^{-1}$

B. $5 cm s^{-1}$

C. $10 cm^{-1}$

D. $15 cm^{-1}$

Answer:

Watch Video Solution

181. A source of sound of frequency 512 Hz is placed inside water. The speed of sound in water is $1482ms^{-1}$ and in air it is $320ms^{-1}$. The frequency of sound recorded by an observer who is standing in air is

A. 206 Hz

B. 3000 Hz

C. 120 Hz

D. 512 Hz

Answer:

Watch Video Solution

182. A man is standing between two parallel cliffs and fires a gun. If he hears first and second echoes after 1.2 s and 3.6 s respectively, the distance between the cliffs is (velocity of sound in air = $340ms^{-1}$)

A. 1190 m

B. 850 m

C. 595 m

D. 816 m

Answer:

Watch Video Solution

183. A wave of frequency 512 Hz has a velocity of $320ms^{-1}$. The distance between the particles differing in phase by 90 degree is

A. 15.6 cm

B. 31.5 cm

C. 62.5 cm

D. 31.25 cm

Answer:

Watch Video Solution

184. Assertion: The water waves in the ocean are always normal to the shore.

Reason: Waves on the surface of water are transverse in nature

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer:

185. The smallest change in sound intensity that can be detected by the human ear is

A. 0.51 dB

B. 0.1 dB

C. 1 dB

D. 2 dB

Answer:

 Watch Video Solution

186. a narrow pulse for example a short pip by a whistle is sent across a medium. If the pulse rate is 1 after every 20 s, (that is the whistle is blown for a split of second after every 20 s), the frequency of the note produced by the whistle is

A. $1/20Hz$

B. 0.5 Hz

C. 1 Hz

D. unknown

Answer:

Watch Video Solution

187. If the bulk modulus of water is 2100 MPa, what is the speed of sound in water ?

A. $1450 m / s$

B. $2100 m / s$

C. $0.21 m / s$

D. $21 m / s$

Answer:

Watch Video Solution

188. Choose the correct option?

If pressure of air gets doubled, then velocity of sound in air

A. gets doubled

B. becomes four times

C. remains unchanged

D. becomes half

A. gets doubled

B. remains unchanged

C. $\sqrt{2}$ times intial velocity

D. becomes half

Answer:

Watch Video Solution

189. Wavelength of the transverse wave is 30 cm. If the particle at some instant has

displacement 2 cm, find the displacement of the particle 15 cm away at the same instant.

A. 2 cm

B. 17 cm

C. -2 cm

D. -17 cm

Answer:

Watch Video Solution

190. A tuning fork has frequency 512 Hz. The number of vibrations of the fork in the time during which the sound from the tuning fork reaches 332 m in air are (velocity of sound in air is $332m/s$.)

A. 100

B. 200

C. 332

D. 512

Answer:

Watch Video Solution

191. Assertion: A tuning fork is made of an alloy of steel, nickel and chromium.

Reason: The alloy of steel, nickel and chromium is called elinvar.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer:

Watch Video Solution

192. If the splash is heard 4.23 s after a stone is dropped into a pit in which water level is 78.4 m deep, the velocity of sound is

A. $360.9m/s$

B. $350.9 m / s$

C. $340.9 m / s$

D. $330.9 m / s$

Answer:

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193. A closed organ pipe of length L and an open organ pipe contain gases of densities pi and p2 respectively. The compressibility of gases is equal in both the pipes. Both the

pipes are vibrating in their first overtone with same frequency. The length of the open organ pipe is

A. $\frac{L}{3}$

B. $\frac{4L}{3}$

C. $\frac{4L}{3}\sqrt{\frac{\rho_1}{\rho_2}}$

D. $\frac{4L}{3}\sqrt{\frac{\rho_2}{\rho_1}}$

Answer:

Watch Video Solution

194. A man is watching two trains, one leaving and the other coming in with equal speeds of $4m/s$. If they sound their whistles, each of frequency 240 Hz, the number of beats heard by the man (velocity of sound in air = $320m/s$) will be equal to

A. 6

B. 12

C. 18

D. 24

Answer:

Watch Video Solution

195. Which of the following requires a medium for their propogation?

A. light wave

B. electromagnetic wave

C. microwave

D. sound wave

Answer:

Watch Video Solution

196. Sound waves travel at $350m/s$ through a warm air and at $3500m/s$ through brass. The wavelength of a 700 Hz acoustic wave as it enters brass from warm air

A. decreases by a factor 20.

B. decreases by a factor 10.

C. increases by a factor 20.

D. increases by a factor 10.

Answer:

Watch Video Solution

197. If velocity of sound in a gas is $360 m / s$ and the distance between a compression and the nearest rarefaction is 1 m, then the frequency of sound is

A. 90 Hz

B. 180 Hz

C. 360 Hz

D. 720 Hz

Answer:

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198. The equation of the progressive wave is $Y = 3\sin\left[x\left(\frac{t}{3} - \frac{x}{5}\right) + \frac{\pi}{4}\right]$ where x and Y are in metre and time in second. Which of the following is correct?

A. velocity, $v = 1.5m/s$

B. amplitude, A = 3 cm

C. frequency, f = 0.2 Hz

D. wavelength, $\lambda = 10m$

Answer:

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199. A wave travelling in the +ve x-direction having displacement along y-direction as 1 m,

wavelength 2π m and frequency of $\frac{1}{\pi}$ Hz is represented by

A. y=sin(x-2t)

B. $y = \sin(2\pi x - 2\pi t)$

C. $y = \sin(10\pi x - 20\pi t)$

D. $y = \sin(2\pi x + 2\pi t)$

Answer:

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200. A sound wave y=$A_0 \sin(\omega t - kx)$ is reflected from a rigid wall with 64% of its ampltitude. The equation of the reflected wave is

A. $y = \frac{64}{100} A_0 \sin(\omega t + kx)$

B. $y = -\frac{64}{100} A_0 \sin(\omega t - kx)$

C. $y = -\frac{64}{100} A_0 \sin(\omega t + kx)$

D. $y = \frac{64}{100} A_0 \cos(\omega t - kx)$

Answer:

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201. A transverse wave is described by the equation $Y = Y_0 \sin 2\pi\left(ft - \frac{x}{\lambda}\right.$. The maximum particle velocity is four times the wave velocity if

A. $\lambda = \frac{\pi Y_0}{4}$

B. $\lambda = \frac{\pi Y_0}{2}$

C. $\lambda = \pi Y_0$

D. $\lambda = 2\pi Y_0$

Answer:

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202. The displacement y of wave trvelling in the x-direction is given by $y = 10^{-4}\sin\left(600t - 2x + \frac{\pi}{3}\right)$ metres, where x is expressed in metres and t in seconds. The speed of the wave motion, in ms^{-1}, is

A. 200

B. 300

C. 600

D. 1200

Answer:

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203. When a wave travels in a medium, the particle displacement is given by the equation $y = \alpha \sin 2\pi(bt - cx)$ where a, b and c are constants. The maximum particle velocity will be twice the wave velocity if

A. $c = \frac{1}{\pi a}$

B. $c = \pi a$

C. $b = ac$

D. $b = \frac{1}{ac}$

Answer:

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204. Helium has density of $0.179 \frac{kg}{m^3}$ at S.T.P. Considering helium gas as an ideal gas, the speed of sound waves in helium is nearly

A. $752 m / s$

B. $810 m / s$

C. $971 m / s$

D. $1030 m / s$

Answer:

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205. At which temperature the speed of sound in hydrogen will be same as that of speed of sound in oxygen at $100^{\circ} C$?

A. $-148^\circ C$

B. $-2125^\circ C$

C. $-317.5^\circ C$

D. $-249.7^\circ C$

Answer:

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206. The velocity of sound waves in diatomic gas at $30^\circ C$

A. is greater, the greater the molecular weight of the gas.

B. is greater, the smaller the molecular weight of the gas

C. is independent of the molecular weight of the gas

D. is less than the speed of sound in a triatomic gas of same molecular weight.

Answer:

207. The velocity of sound in air at $20^\circ C$ and 1 atm pressure in $344.2 m / s$. At $40^\circ C$ and 2 atm pressure, the velocity of sound in air is

A. $350 m / s$

B. $356 m / s$

C. $363 m / s$

D. $370 m / s$

Answer:

Watch Video Solution

208. A uniform string of length 20 m is suspended from a rigid support. A short wave pulse is introduced at its lowest end. It starts moving up the string. The time taken to reach the support is (take g = $10ms^{-2}$)

A. 2s

B. $2\sqrt{2}s$

C. $\sqrt{2}s$

D. $2\pi\sqrt{2}s$

Answer:

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209. It is possible to recognize a person by hearing his voice even if he is hidden behind a solid wall. This is due to the fact that his voice

A. has definite pitch

B. has a definite quality

C. has a definite capacity.

D. can penetrate the wall.

Answer:

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210. When source of sound moves towards a stationary observer, the wavelength of sound received by him

A. decreases while frequency increases

B. remains the same whereas frequency increases

C. increases and frequency also increases

D. decreases while frequency remains the same

Answer:

Watch Video Solution

211. When the observer moves towards the stationary source with velocity, 'V_1', the apparent frequency of emitted note is 'F_1'. When the observer moves away from the source with velocity 'V_1', the apparent

frequency is $'F_2'$. If 'V' is the velocity ofsound in air and $\frac{F_1}{F_2} = 2$ then $\frac{V}{V_1} = ?$

A. 2

B. 3

C. 4

D. 5

Answer:

Watch Video Solution

212. The observer is moving with velocity 'v_0' towards the stationary source of sound and then after crossing moves away from the source with velocity 'v_0'. Assume that the medium through which the sound waves travel is at rest, If 'v' is the velocity of sound and 'n' is the frequency emitted by the spurce then the difference between apparent frequencies heard by the observer is

A. $\frac{2nv_0}{v}$

B. $\frac{nv_0}{v}$

C. $\frac{v}{2nv_0}$

D. $\frac{v}{nv_0}$

Answer:

Watch Video Solution

213. A source of sound S is moving with a velocity $50m/s$ towards a stationary observer. The observer measures the frequency of the source as 1000 Hz. What will be the apparent frequency of the source when it is moving

away from the observer after crossing him? The velocity of sound in the medium is $350 m / s$.

A. 750 Hz

B. 857 Hz

C. 1143 Hz

D. 1333 Hz

Answer:

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214. A train is moving on a straight track with speed $20ms^{-1}$. It is blowing its whistle at the frequency of 1000 Hz. The percentage change in the frequency heard by a person standing near the track as the train passes him is (speed of sound = $320ms^{-1}$) close to

A. 0.06

B. 0.12

C. 0.18

D. 0.24

Answer:

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215. The pitch of the whistle of an engine appears to drop to $\left(\frac{5}{6}\right)^{th}$ of original value when it passes a stationary observer. If the speed of sound in air in $350m/s$ then the speed of engine is

A. $35m/s$

B. $70m/s$

C. $105m/s$

D. $140m/s$

Answer:

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216. A motor car blowing a horn of frequency $124vib/s$ moves with a velocity $72km/hr$ towards a tall wall. The frequency of the reflected sound heard by the driver will be (velocity ofsound in air is $330m/s$)

A. $109 vib / s$

B. $132 vib / s$

C. $140 vib / s$

D. $248 vib / s$

Answer:

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217. A train is moving with a uniform speed of $33 m / s$ and an observer is approaching the train with the same speed. If the train blows a

whistle of frequency 1000 Hz and the velocity of sound is $333m/s$ then the apparent frequency of the sound that the observer hears is

A. 1220 Hz

B. 1099 Hz

C. 1110 Hz

D. 1200 Hz

Answer:

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218. Two cars moving in opposite directions approach each other with speed of $22m/s$ and $16.5m/s$ respectively. The driver of the first car blows a hom having a frequency 400 Hz. The frequency heard by the driver of the second car is [velocity of sound $340m/s$]:

A. 350 Hz

B. 361 Hz

C. 361 Hz

D. 448 Hz

Answer:

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219. A siren emitting a sound of frequency 800 Hz moves away from an observer towards a cliff at a speed of $15ms^{-1}$. Then, the frequency of sound that the observer hears in the echo reflected from the cliff is (Take velocity of sound in air = $330ms^{-1}$)

A. 838 Hz

B. 885 Hz

C. 765 Hz

D. 800 Hz

Answer:

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220. A car with a hom of frequency 620 Hz travels towards a large wall with a speed of $20m/s$. velocity of sound is $330m/s$. The

frequency of echo of sound of hom as heard by the driver is

A. 700 Hz

B. 660 Hz

C. 620 Hz

D. 550 Hz

Answer:

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221. A police car with a siren of frequency 8 kHz is moving with uniform velocity $36km/hr$ towards a tall building which reflects the sound waves. The speed of sound in air is $320m/s$. The frequency of the siren heard by the car driver is

A. 8.50 kHz

B. 8.25 kHz

C. 7.75 kHz

D. 7.50 kHz

Answer:

Watch Video Solution

222. A source of sound S is moving with a velocity $50m/s$ towards a stationary observer. The observer measures the frequency of the source as 1000 Hz. What will be the apparent frequency of the source when it is moving away from the observer after crossing him? The velocity of sound in the medium is $350m/s$.

A. 400 Hz

B. 666 Hz

C. 375 Hz

D. 177.5 Hz

Answer:

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223. A railway engine whistling at a constant frequency moves with a constant speed and it goes past a stationary observer standing

beside the railway track. Then the frequency of (n') of the sound heard by the observer with respect to time (t) can be best represented by which of the following curve?

A. 

B. 

C. 

D. 

Answer:

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224. A source of sound S emitting waves of frequency 100 Hz and an observer O are located at some distance from each other. The source is moving with a speed of $19.4ms^{-1}$ at an angle of 60° with the source observer line as shown in the figure. The observer is at rest. The apparent frequency observed by the observer (velocity of sound in air $330ms^{-1}$), is:

A. 97 Hz

B. 100 Hz

C. 103 Hz

D. 106 Hz

Answer:

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225. A drone fitted with siren in flying directly away from the drone operator and towards a distant building at a speed of $15m/s$. The siren produces sound of frequency 780 Hz.

What is the frequency that the operator hears in the echo reflected from the building (Speed of sound is $340 m / s$).

A. 766 Hz

B. 800 Hz

C. 816 Hz

D. 840 Hz

Answer:

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226. A siren placed at a railway platform is emitting a sound of frequency 5 kHz. A passenger sitting in a moving train 'A' records the frequency of the siren as 5.5 kHz. During his return journey by train 'B' he records the frequency of the siren as 6 kHz. The ratio of the speed of train B to that of train A is

A. $\frac{242}{252}$

B. 2

C. $\frac{5}{6}$

D. $\frac{11}{6}$

Answer:

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227. Two trains A and B are approaching a platform from opposite directions. The siren in the station is making a sound at a frequency 4 kHz. The passengers in trains A and B hear siren at frequencies 4.5 and 5 kHz respectively. Then the velocities of the trains A and B are (velocity of sound in air = $340 m / s$)

A. $42.5m/s, 85m/s$

B. $75m/s, 55m/s$

C. $85m/s, 8.5m/s$

D. $42.5m/s, 6.25m/s$

Answer:

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228. A train has just completed a U-curve in a track which is a semicircle. The engine is at the forward end of the semi-circular part of the

track while the last carriage is at the rear end of the semi-circular track. The driver blows a whistle of frequency 200 Hz. Velocity of sound is $340m/s$. Then the apparent frequency as observed by a passenger in the middle of a train when the speed of the train is $30m/s$ is

A. 219 Hz

B. 188 Hz

C. 200 Hz

D. 181 Hz

Answer:

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229. A car is moving with a speed of $72km - hour^{-1}$ towards a roadside source that enits sound at a frequency of 850 Hz. The car driver listens to the sound while approching the source and again while moving away from the source after crossing it. If the velocity of sound is $340ms^{-1}$, the difference of the two frequencies the driver hears is

A. 50 Hz

B. 85 Hz

C. 100 Hz

D. 150 Hz

Answer:

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230. The velocity of sound is greatest in

A. steel

B. ammonia

C. air

D. water

Answer:

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231. A heavy ball of mass M is suspended from the ceiling of a car by a light string of mass m $(m << M)$. When the car is at rest, the speed of transverse waves in the string is

$60ms^{-1}$. When the car has acceleration a, the wave-speed increases to $60.5ms^{-1}$. The value of a, in terms of gravitational acceleration g, is closest to

A. $\frac{g}{30}$

B. $\frac{g}{5}$

C. $\frac{g}{20}$

D. $\frac{g}{10}$

Answer:

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232. The transverse displacement of a string clamped at both ends is by $y(x,t) = 0.06 \sin\left(\frac{2\pi x}{3}\right) \cos 60\pi t$, where x and y are in m and t in s. The length of the string is 1.5 m and its mass is $3 \times 10^{-2} kg$. The tension developed in the string is

A. 81 N

B. 162 N

C. 90 N

D. 180 N

Answer:

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233. Two boys stand close to a long straight metal pipe, at some distance from each other. One boy fires a gun and the other hears two explosions with a time interval of 1 s between them. If the velocity of sound in metal is $3630 m/s$ and in air is $330 m/s$, then the distance between the two boys is

A. 36.3 m

B. 363 m

C. 72.6 m

D. 726 m

Answer:

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234. A uniform rope of length L and mass m_1 hangs vertically from a rigid support. A block of mass m_2 is attached to the free end of the

rope. A transverse pulse of wavelength λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2 . The ratio $\frac{\lambda_2}{\lambda_1}$ is

A. $\sqrt{\frac{m_2}{m_1}}$

B. $\sqrt{\frac{m_1+m_2}{m_1}}$

C. $\sqrt{\frac{m_1}{m_2}}$

D. $\sqrt{\frac{m_1+m_2}{m_2}}$

Answer:

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235. A granite rod of 60 cm length is clamped at its middle point and is set into longitudinal vibrations. The densit of grantite is $2.7 \times 10^3 kg/m^3$ and its Young's modulus is 9.27×10^{10} Pa. WHat will be the fundamental frequency of the longitudinal vibrations?

A. 10 kHz

B. 7.5 kHz

C. 5 kHz

D. 2.5 kHz

Answer:

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236. At a temperature of 314 K and a pressure of 100 kPa, the speed of sound in a gas is $1380ms^{-1}$. The radius of each gas molecule is $0.5\overset{\circ}{A}$. The frequency of sound at which the wavelength of sound wave in the gas becomes equal to the mean free path of the gas molecules is (Boltzman Constant $= 1.38 \times 10^{-23} JK^{-1}$

A. 1000 MHz

B. $1000\sqrt{2}MHz$

C. $\frac{1000}{\sqrt{2}}MHz$

D. $500MHz$

Answer:

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237. The extension in a string, obeying Hooke's law, is x. The speed of the wave in the stretched string is v. If the extension of string

is increased to 1.5 x, then the speed of the wave in the string will be

A. 1.22 v

B. 0.61 v

C. 1.50 v

D. 0.75 v

Answer:

238. When sound is produced in an aeroplane moving with a velocity of $250m/s$ horizontally its echo is heard after 12 seconds. If velocity of sound in air is $300ms^{-1}$, the elevation of aircraft is

A. 995 m

B. 758 m

C. 1250 m

D. 2500 m

Answer:

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239. Neon is 20 times heavier than hydrogen. The equal volumes of hydrogen and neon are mixed. The ratio of speed of sound in the mixture to that in hydrogen is

A. $\sqrt{\frac{2}{21}}$

B. $\sqrt{\frac{1}{8}}$

C. $\sqrt{\frac{2}{17}}$

D. $\sqrt{\frac{32}{17}}$

Answer:

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240. Sound waves in air are always longitudinal, because

A. density of air is very small

B. air is a mixture of several gases

C. air does not have a modulus of rigidity.

D. of the inherent characteristics of sound waves in air.

Answer:

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241. Which of the following doesn't produce a sound wave?

A. A bell ringing under water.

B. An explosion in outer space

C. A gun fired in a room with no echoes.

D. A hammer hitting a block of rubber.

Answer:

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242. The ratio of velocity of sound in hydrogen and chlorine at STP is

A. $6:1$

B. $8:1$

C. $4:1$

D. $2:1$

Answer:

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243. Assertion: For sound waves, air is rarer medium than water.

Reason: For sound waves, the density of water is greater than air.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion.

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion.

C. Assertion is True, Reason is False.

D. Assertion is False, Reason is False.

Answer:

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244. Which of the following statements is true for wave motion ?

A. Mechanical transverse waves can propagate through all media.

B. Longitudinal waves can propagate through solids only.

C. Mechanical transverse waves can propagate through solids only

D. Longitudinal waves can propagate through vacuum.

Answer:

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245. The ratio of the speed of sound in nitrogen gas to that in helium gas, at 300 K is

A. $\sqrt{2/7}$

B. $1/\sqrt{7}$

C. $\sqrt{3}/5$

D. $\sqrt{6/5}$

Answer:

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246. A source of sound of frequency 750 Hz is placed inside water. The speed of sound in water is $1500 m / s$ and in air is $340 m / s$. The frequency of sound recorded by an observer who is standing in air is

A. 375 Hz

B. 3309 Hz

C. 170 Hz

D. 750 Hz

Answer:

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247. An observer standing near the seashore observes 42 waves per minute. If the wavelength of the water wave is 12 m then the velocity of water wave is

A. $540ms^{-1}$

B. $8.4ms^{-1}$

C. $0.184ms^{-1}$

D. $3.5ms^{-1}$

Answer:

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248. Under similar conditions of temperature and pressure, in which of the gases the speed of sound will be the greatest?

A. H_2

B. N_2

C. He

D. CO_2

Answer:

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