PHYSICS

BOOKS - MCGROW HILL EDUCATION PHYSICS (HINGLISH)

WAVE MOTION AND SOUND

Elementary Questions

1. The time period of a simple pendulum depends on its_____

A. mass

B. length

C. amplitude

D. energy

Answer: B

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2. A simple pendulum suspended from the ceiling of a trans has a time period T when

the train is at rest. If the train is accelerating

uniformly at a then its time period

A. increase

B. decrease

C. become infinite

D. remain unaffected

Answer: B

3. The time period T is found to depend upon L as

    A. $T \propto L$

    B. $T \propto L^2$

    C. $T^2 \propto L$

    D. $T \propto \sqrt{\dfrac{1}{L}}$

Answer: C

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4. The relation between T and g is given by

A. $T \propto g$

B. $T \propto g^2$

C. $T^2 \propto g$

D. $T \propto \sqrt{\dfrac{1}{g}}$

Answer: D

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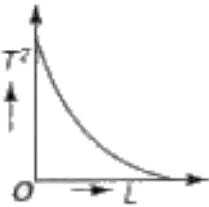**5.** The graph between L and T^2 is

A.

B.

C.

D.

Answer: A

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6. The oscillations of a pendulum slow down due to

A. the force exerted by air and friction at the support

B. the force exerted by air only

C. the forces exerted by friction at the support only

D. none of these

Answer: A

7. If a simple pendulum oscillates in water instead of air then the time period will -

    A. increase

    B. decrease

    C. remain same

    D. none of these

Answer: A

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

A. decrease

B. increase

C. remain same

D. none of these

Answer: A

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9. Kinetic energy of the bob of a simple pendulum is maximum

   A. at the mean position

   B. at the extreme left position

   C. at the extreme right position

   D. none of these

Answer: A

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10. If the string of a pendulum were cut when the bob is at its central position, the bob would fall to the earth due to the absence of the

A. force of buoyancy

B. force of deformation

C. force exerted by the string in the downward direction

D. force exerted by the string in the upward direction

Answer: C

11. Though the forces are balanced at the mean position, even then the bob crosses over to the other extreme position after being released. This is due to

A. inertia of the bob

B. potential energy of the bob

C. velocity of the bob

D. none of these

Answer: A

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

    A. becomes double

    B. becomes half

    C. becomes 4 times

D. remains the same

Answer: D

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13. When the bob is in the central position, the forces are

A. balanced

B. unbalanced

C. sometimes balanced and sometimes

unbalanced

D. none of these

Answer: A

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14. The phenomenon in which the amplitude

of oscillation of a pendulum decreases

gradually is called

A. decay period of oscillation

B. damping

C. building up of oscillation

D. maintained oscillation

Answer: B
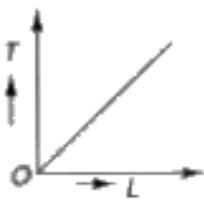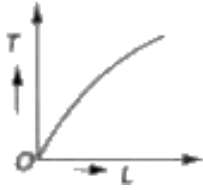
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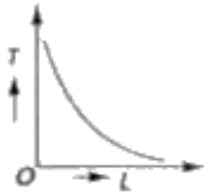**15.** The graph between L and Tis correctly shown by (Fig. 7.2)

A.

B.

C.

D.

Answer: B

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16. The length of a pendulum is doubled and the mass of its bob is halved. Its time period would

    A. become double

    B. become half

    C. become $\sqrt{2}$ times

    D. remains the same

Answer: C

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17. A pendulum having a period of oscillation of 2 seconds is taken on a planet where g is four times that on the earth. The period of the pendulum would be

A. 2s

B. 1 s

C. 4 s

D. $2\sqrt{2}$ s

Answer: B

18. Potential energy of the bob is maximum

    A. at the mean position

    B. at the extreme positions

    C. between the mean position and extreme

       positions

    D. none of these

Answer: B

19. The force which tries to bring the body back to its mean position is called

    A. deforming force

    B. restoring force

    C. gravitational force

    D. buoyant force

Answer: B

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20. For a given length of a pendulum, the time period is maximum

    A. on the surface of the earth

    B. on the surface of the moon

    C. at the centre of the earth

    D. none of these

Answer: B

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

A. Solid

B. Both solid and liquid

C. Liquid

D. Gas

Answer: A

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22. Sound waves in air are

    A. longitudinal

    B. radio

    C. transverse

    D. electromagnetic

Answer: A

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23. Assertion : Sound waves cannot propagate through vacuum but light waves can.

Reason : Sound waves cannot be polarised but light waves can.

A. a solid-liquid mixture

B. an ideal gas

C. a liquid-gas mixture

D. a perfect vacuum

Answer: D

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

A. 30 Hz

B. 30,000 Hz

C. 300 Hz

D. 3000 Hz

Answer: B

25. The frequency of sound waves can be expressed in

A. Hz only

B. cycles/second only

C. s^{-1} only

D. all the above

Answer: D

26. The distance between two consecutive crests is L, then the wavelength is given by

A. L/2

B. 2L

C. 4L

D. L

Answer: D

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27. If the distance between a crest and its consecutive trough is L, then the wavelength is given by

A. L/2

B. L

C. 4L

D. 2L

Answer: D

28. The product of the time period of a wave and its frequency is

A. infinite

B. zero

C. more than unity but less than infinity

D. unity

Answer: D

29. A wave completes 20 vibrations in 2.5 s. Its frequency is

A. 20 Hz

B. 8 Hz

C. 200 Hz

D. 50 Hz

Answer: B

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30. Imagine a cannon being fired on the surface of the moon. Then

A. the sound will be heard at the surface of the earth during all seasons

B. the sound will not be heard at the surface of the earth but will be heard on the moon.

C. the sound will be heard at the surface of the earth during the rainy season

D. no sound will be heard on the earth or

on the moon

Answer: D

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31. Sound waves are

A. transverse mechanical waves

B. longitudinal mechanical waves

C. neither (a) nor (b)

D. none of these

Answer: B

32. The speed of sound wave in a given medium is

A. directly proportional to its frequency

B. inversely proportional to its frequency

C. directly proportional to the square of its

frequency

D. independent of its frequency

Answer: A

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33. Supersonic means

A. frequencies less than 20 Hz

B. same as ultrasonic

C. frequencies much more than that of ultrasonics

D. same as infrasonics

Answer: B

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34. The frequency of a wave is 5 Hz. It refers to (type of wave)

A. ultrasonics

B. microwaves

C. infrasonics

D. radio waves

Answer: C

35. A tuning fork is excited and placed on a tube a larger booming sound is heard because of

A. forced vibrations

B. resonance

C. beats

D. reflection

Answer: A

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36. A wave completes 24 cycles in 0.8 s. The frequency of the wave is

A. 30 Hz

B. 8 Hz

C. 24 Hz

D. 12 Hz

Answer: A

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37. The time period of the above wave would

be

A. $1/30$ s

B. 30 s

C. $1/24$s

D. none of these

Answer: A

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38. Obtain a relation between speed, frequency and wavelength of a wave.

A. $v = n\lambda$

B. $n = 1$

C. $v = \dfrac{n}{2}$

D. $n = T$

Answer: A

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39. Frequency (v) and time period (J) are related as

A. 1/30s

B. 30 s

C. 1/24 s

D. none of these

Answer: A

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40. A body produces sound only if it is

A. made of steel

B. made of glass

C. plucked

D. vibrating

Answer: D

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41. If the time period of a wave increases, its frequency will

A. increase

B. decrease

C. remain the same

D. first increases then decreases

Answer: B

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42. A pulse is a wave

A. of high duration

B. of short duration

C. which travels in vacuum only

D. which travels in solids only

Answer: B

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43. When we pluck the wire of a sitar, the waves produced in the wire are

A. longitudinal

B. transverse

C. sometimes longitudinal and sometimes

transverse

D. electiumagnetic

Answer: B

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44. When we pluck the wire of a sitar, the waves produced in the air are

A. longitudinal

B. transverse

C. sometimes longitudinal and sometimes

transverse

D. electromagnetic

Answer: A

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45. A crest is the point of

A. zero displacement

B. maximum displacement

C. minimum displacement

D. none of these

Answer: B

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46. Sound travels fastest in

A. water

B. steel

C. air

D. kerosene oil

Answer: B

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47. Two particles having the same phase must

be at

A. one crest and one trough

B. one crest and the mean position

C. one trough and the mean position

D. two consecutive crests

Answer: D

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48. If the frequency of a wave is doubled, its wavelength

A. becomes doubled

B. remains same

C. becomes half of the original

D. none of these

Answer: C

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49. A boat at anchor is rocked by waves whose crests are $100m$ apart and whose speed is $25m/s$. These waves reach the boat once every :
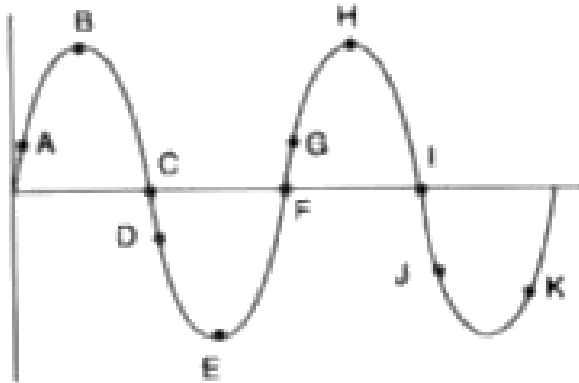
A. 0.35 s

B. 4 s

C. 75 s

D. 2500 s

Answer: B

50. Figure 7.3 shows that the shape of a part of a long string in which transverse waves are produced. Which pair of particles are in

phase?

A. A and G

B. D and G

C. B and E

D. C and K

Answer: A

51. State the general name of the waves in which the particles of the medium vibrate:

(i) in the same direction as wave.

(ii) at right angles to the direction of wave.

A. linear waves

B. longitudinal waves

C. transverse waves

D. electromagnetic waves

Answer: B

52. Velocity of sound is maximum in

A. iron

B. mercury

C. water

D. air

Answer: A

53. The vibrating body while playing a violin is

A. wire

B. the box of the violin

C. both wire and box

D. only air

Answer: C

54. The waves which propagate in metals are

A. longitudinal

B. transverse

C. both (a) and (b)

D. neither (a) nor (b)

Answer: C

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55. Velocity of sound is maximum in

A. nitrogen

B. hydrogen

C. air

D. carbon dioxide

Answer: D

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56. The distance between two consecutive points in the same phase is called

A. pitch

B. velocity

C. wavelength

D. period

Answer: C

57. Sound takes some time to travel from one place to another. It will be maximum

    A. at night

    B. during summer

    C. during winter

    D. all the time same

Answer: C

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58. The periodic time of a vibrating body is 0.01 sec. Its frequency will be

A. 1.0 c/s

B. 10.0 c/s

C. 100.0 c/s

D. 1000.0 c/s

Answer: C

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59. The sound propagates in a gaseous medium by

    A. transverse waves

    B. longitudinal waves

    C. both (a) and (b)

    D. neither (a) nor (b)

Answer: B

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60. If a wave of wavelength λ is travelling in a medium with velocity V, then its frequency is

A. $\dfrac{V}{\lambda}$

B. $V\lambda$

C. $\dfrac{\lambda}{V}$

D. $\dfrac{1}{V\lambda}$

Answer: A

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61. If a wave of time period T travels withavelocity V, then the wavelength is given by

A. V

B. VT

C. $\dfrac{1}{VT}$

D. $\dfrac{T}{V}$

Answer: B

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62. The motion of a simple pendulum is

A. exactly simple harmonic

B. exactly rectilinear

C. approximately simple harmonic

D. none of these

Answer: C

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63. A particle is moving on a circular track with uniform speed. Its motion is

A. periodic and simple harmonic

B. periodic but not simple harmonic

C. damped

D. none of the above

Answer: B

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64. The persistence of hearing for human beings is not more than

A. 1 s

B. $\dfrac{1}{5}s$

C. $\dfrac{1}{10}s$

D. $\dfrac{1}{2}s$

Answer: C

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65. Vibrations, whose amplitudes of oscillations decrease with time, are called

A. free vibrations

B. forced vibrations

C. damped vibrations

D. none of these

Answer: C

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66. Waves produced due to the earthquake are known as

A. seismic waves

B. shock waves

C. infrasonic waves

D. none of these

Answer: A

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67. The speed of electromagnetic waves in air is

A. 3×10^5 km/s

B. 3×10^6 km/s

C. 3×10^7 km/s

D. 3×10^8 km/s

Answer: A

68. Which of the following types of waves is different from others?

A. Light waves

B. X-rays

C. Radio waves

D. Sound waves

Answer: D

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69. Waves produced by supersonic jet planes are

A. shock waves

B. seismic waves

C. infrasonics

D. none of these

Answer: A

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70. On the surface of the moon, a clock will

A. run slow

B. run fast

C. remain stationary

D. nothing can be. Decided

Answer: A

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71. The frequency of the seconds pendulum is

A. 0.5 Hz

B. 1.0 Hz

C. 2.0 Hz

D. none of these

Answer: A

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72. Water waves are

A. longitudinal

B. transverse

C. neither longitudinal nor transverse

D. both longitudinal and transverse

Answer: D

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73. The speed of a wave is $340 \ ms^{-1}$. What is the wavelength of the wave if its frequency is 500 Hz?

A. 0.68 m

B. 6.8 m

C. 68 m

D. 0.068 m

Answer: A

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74. Mention the 'SI unit of period of oscillation.

A. cm

B. m

C. km

D. none of these

Answer: B

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75. Echo is produced due to

A. reflection of sound

B. refraction of sound

C. resonance

D. none of these

Answer: A

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76. The echo will be heard if the original sound

reflected by an obstacle reaches our ears after

A. 10 s

B. 5s

C. 1 s

D. 0.1 s

Answer: D

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77. An echo will be heard if the minimum distance between the source of sound and the obstacle is

A. 1 m

B. 10 m

C. 15 m

D. 17 m

Answer: D

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78. SONAR is based on the principle of

A. echo

B. resonance

C. reverberation

D. any one of the above

Answer: A

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79. The audible range of frequency is

A. 20 Hz to 20,000 Hz

B. 40 Hz to 40,000 Hz

C. 60 Hz to 60,000 Hz

D. 10 Hz to 20,000 Hz

Answer: A

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80. Which of the following frequencies of sound cannot be heard by human beings?

A. 5 Hz

B. 20 Hz

C. 400 Hz

D. 1000 Hz

Answer: A

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81. Which of the following frequencies of sound can't be heard by human beings?

A. 40 Hz

B. 400 Hz

C. 4000 Hz

D. 40,000 Hz

Answer: D

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82. Velocity of sound in air is about

A. 330 m/s

B. 360 m/s

C. 380 m/s

D. 400 m/s

Answer: A

83. The depth of the troughs of a wave is called its

A. amplitude

B. displacement

C. frequency

D. none of these

Answer: A

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84. The height of the crests of a wave is called its

A. amplitude

B. displacement

C. frequency

D. none of these

Answer: A

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1. Which of the following waves is not same as others?

A. Sound waves

B. Waves on the surface of water

C. Waves on strings

D. Radio waves

Answer: D

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2. The medium for wave propagation should

have the property of

A. inertia

B. elasticity

C. minimum frictional resistance

D. all of the above

Answer: D

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3. Which of the following waves does not require any material medium for their propagation?

A. Sound waves

B. Radio waves

C. X-rays

D. Both (b) and (c)

Answer: D

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4. The distance in which one compression and one rarefaction are contained is called

A. amplitude

B. displacement

C. wavelength

D. none of these

Answer: C

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5. When a sound wave goes from one medium to another, the quantity X remains unchanged. X is

A. speed

B. wavelength

C. amplitude

D. frequency

Answer: D

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6. The ratio of the speed of a body to the speed of sound is known as

A. refractive index

B. mach number

C. relative density

D. none of these

Answer: B

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7. Water waves are

A. transverse

B. longitudinal

C. both longitudinal and transverse

D. neither transverse nor longitudinal

Answer: C

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8. With decrease in water vapour content in air, velocity of sound

A. increases

B. decreases

C. remains constant

D. either (a) or (b)

Answer: B

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9. Suresh standing symmetrically between two cliffs claps his hands and starts hearing a series of echoes at intervals of 1 second. If

speed of sound in air is 340 m/s, the distance

between the parallel cliffs must be

A. 320 m

B. 340 m

C. 680 m

D. 760 m

Answer: B

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10. In question 93, if Suresh were standing unsym-metrically between parallel cliffs, the distance between two cliffs is

A. 340 m

B. 510 m

C. 680 m

D. none of these

Answer: A

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11. Wavelength of ultrasonic waves in air is of the order of :

A. 10^2 m

B. 10^1 m

C. 10^{-2}

D. 10^0 m

Answer: D

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12. If the frequency of a tuning fork is 400 Hz, how far will the sound travel when the fork makes 60 vibrations? Given, velocity of sound = $320\ ms^{-1}$

A. 96 m

B. 48 m

C. 24 m

D. 12 m

Answer: B

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13. Velocity of sound is maximum in

A. O_2

B. N_2

C. H_2

D. He

Answer: D

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14. Pitch of sound is related to its

    A. speed

    B. frequency

    C. intensity

    D. amplitude

Answer: B

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15. Quality of sound depends on

A. amplitude

B. frequency

C. overtones

D. none of these

Answer: C

16. Walls of auditorium should be

A. good absorbe

B. good reflector

C. good amplifier

D. none of these

Answer: A

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17. An observer standing at the sea coast observes $54 waves$ reaching the coast per minute. If the wavelength of a wave is $10m$, find the wave velocity.

A. $4ms^{-1}$

B. $7ms^{-1}$

C. $19ms^{-1}$

D. $12ms^{-1}$

Answer: C

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18. In the above question, the waves are

    A. longitudinal waves

    B. transverse waves

    C. combined longitudinal and transverse

       waves

    D. radio waves

Answer: C

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19. What type of waves do you expect in vacuum

    A. longitudinal

    B. transverse

    C. both (a) and (b)

    D. no waves

Answer: D

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20. Velocity of sound in air at NTP is 332 m/s. What will be the velocity, when pressure is doubled and temperature is kept constant?

A. 332 m/s

B. 664 m/s

C. q66 m/s

D. nothing can be decided

Answer: C

21. In a longitudinal wave, there is a state of maximum compression at a point at an instant. The frequency of the wave is 50Hz. After what time will the same point be in the state of maximum rarefaction ?
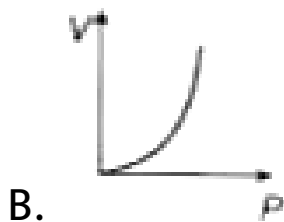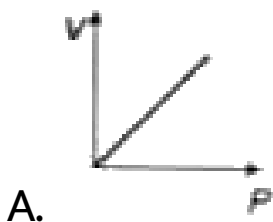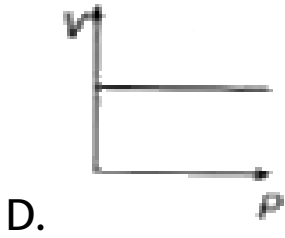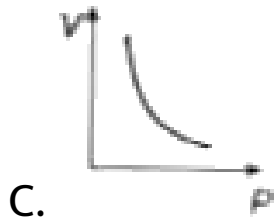
A. 1 s

B. 2 s

C. 0.1 s

D. 0.01 s

Answer: A

22. A student plotted the following four graphs representing the variation of velocity of sound in a gas with the pressure P. Whic one is correct?

A.

B.

C.

D.

Answer: D

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