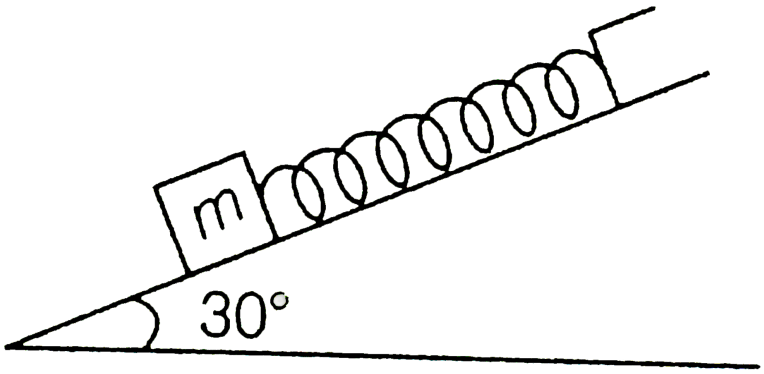
PHYSICS

AAKASH INSTITUTE ENGLISH

MOCK TEST 7

Example

1. A body of mass 5 kg is suspended by a spring balace on an incvlined plane as shown in figure



so, force applied on spring balance is

A. 50 N

B. 25 N

C. 500 N

D. 10 N

Answer: B

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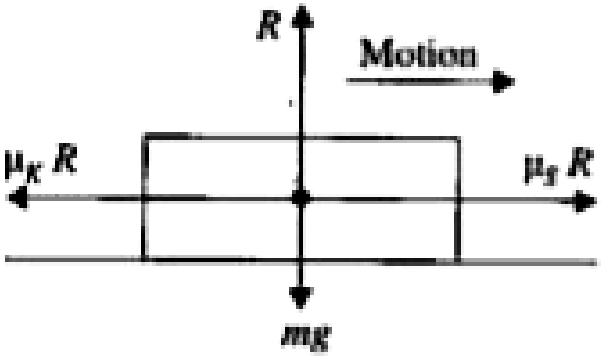
2. For a body on a horizontal surface, coefficients of static and kinetic frictions are 0.4 and 0.2 respectively. When the body is in uniform motion on the surface, a horizontal force equal in magnitude to limiting friction is applied on it. The acceleration produced is



A. $\mu mg\cos\theta$

B. μmg

C. $\frac{\mu mg}{\sqrt{1+\mu^2}}$

D. $\mu m > an\theta$

Answer: C

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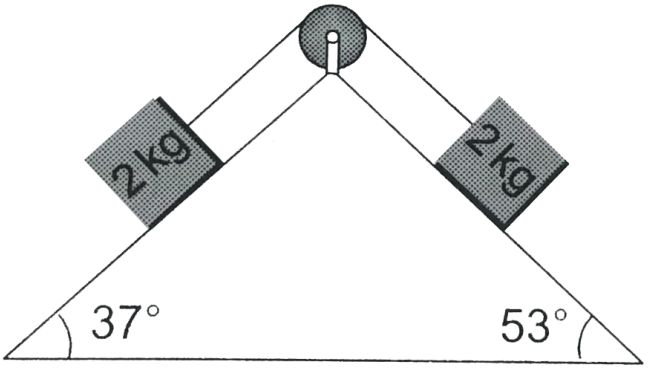
3. The acceleration of system of two bodies over the wedge as shown in figure is



A. $1\frac{m}{s^2}$

B. $2\frac{m}{s^2}$

C. $\frac{1}{2}\frac{m}{s^2}$

D. $10\frac{m}{s^2}$

Answer: A

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4. A block of mass M is held against a rough vertical wall by pressing it with a finger. If the coefficient of friction between the block and the wall is μ and the acceleration due lo gravity is g, what is the minimum force required to be applied by the finger to hold the block against the wall?

A. $M\frac{g}{\mu}$

B. μMg

C. $M\frac{g}{\mu+1}$

D. $(\mu + 1)Mg$

Answer: A

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5. A block of mass m_1 rests on a horizontal table. A string tied to the block is passed on a frictionless pulley fixed at the end of the table and to the other end of string is hung another block of mass m_2. The acceleration of the system is

A. $\frac{m_2 g}{m_1 + m_2}$

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

C. g

D. $\frac{m_2 g}{m_1}$

Answer: A

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6. A block is lying static on the floor. The maximum value of static fictional force on the block is 10 N. If a horizontal force of 6 N is

applied to the block,what will be the frictional force on the block?

A. 2 N

B. 18 N

C. 6 N

D. 10 N

Answer: C

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7. A block is at rest on an inclined plane making an angle α with the horizontal. As the angle of the incline is increased the block start slipping when the angle of inclination becomes θ then coefficient of friction is equal to

A. $\sin\theta$

B. $\cos\theta$

C. $\tan\theta$

D. Independent of θ

Answer: C

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8. A block is kept on an inclined plane of inclination θ of length l. the velocity of particle at the bottom of inclined is (the coefficient of friciton is μ)

A. $\sqrt{2gl(\mu\cos\theta - \sin\theta)}$

B. $\sqrt{2gl(\sin\theta - \mu\cos\theta)}$

C. $\sqrt{2gl(\sin\theta + \mu\cos\theta)}$

D. $\sqrt{2gl(\cos\theta + \mu\sin\theta)}$

Answer: B

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9. The maximum static frictional force is

A. Equal to twice of the area of surface in contact

B. Independent of the area of surface in contact

C. Equal to the area of surface in contact

D. Equal to the half of the area of surface in contact

Answer: B

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10. Select the correct option about the friction between the two bodies

A. Static friction is always greater than kinetic friction

B. Limiting friction is always greater than kinetic friction

C. Limiting friction is not always greater than kinetic friction

D. The direction of friction is always opposite to motion

Answer: B

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11. A block of mass m is moving on a rough horizontal surface. μ is the coefficient of kinetic friction between the block and the surface. What is the net force exerted by the surface on the block?

A. μmg

B. $\mu\left(mg+\left(\frac{P}{2}\right)\right)$

C. $\mu\left(mg-\left(\frac{P}{2}\right)\right)$

D. $\mu\left(mg-\sqrt{3}\frac{P}{2}\right)$

Answer: C

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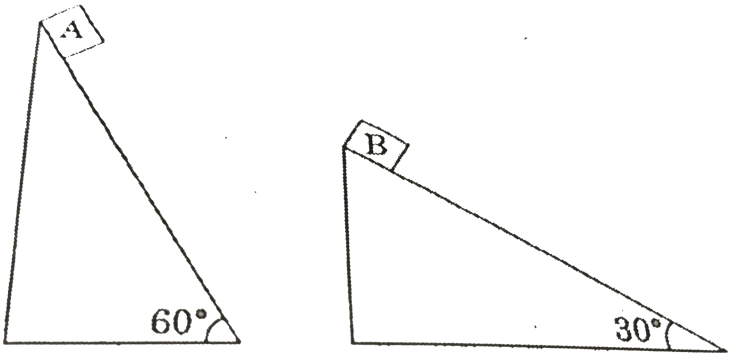
12. Two fixed frictionless inclined plane making an angle 30° and 60° with the vertical are shown in the figure. Two block A and B are placed on the two planes. What is the relative

vertical acceleration of A with respect to B?



A. $4.9\frac{m}{s^2}$ in vertical direction

B. $4.9\ \frac{m}{s^2}$ in horizontal direction

C. $9.8\ \frac{m}{s^2}$ in vertical direction

D. Zero

Answer: A

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13. Consider, a car moving along a straight horizontal road with a speed of 72 km/h. If the coefficient of static friction between the tyre and the road is 0.5, the shortest distance in which the car can be stopped is (Take $g = 10/s^2$)

A. 30m

B. 40 m

C. 72 m

D. 20 m

Answer: B

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14. The upper half of an inclined plane with inclination ϕ is perfectly smooth while the lower half is rough A body starting from rest at the will again come to rest to the bottom if the coefficient of friction for the lower half is given by

A. $\mu = \sin\theta$

B. $\mu = \cot\theta$

C. $\mu = 2\cos\theta$

D. $\mu = 2\tan\theta$

Answer: D

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15. To move a body along a circular path the direction of centripetal force will be

A. Towards the centre

B. Away from the centre

C. Along tangent

D. Normal to the plane of motion

Answer: A

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16. A body of mass m is tied with rope and rotated along horizontal circle of radius r. If T is the tension in the rope and v is the velocity

of body and an instant the force required for circular motion is

A. $T + \frac{mv^2}{r}$

B. $T - \frac{mv^2}{r}$

C. $\frac{mv^2}{r}$

D. $\frac{mv^2}{4r}$

Answer: C

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17. The inward bending of a cyclist while turning is due to

A. Get reaction force

B. Get suitable centripetal force

C. Minimise frictional force

D. All of these

Answer: B

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18. Which of the following statements is correct about friction?

A. It is a conservative force

B. It may cause the motion of body

C. It may oppose the motion of a moving body

D. Both (2) and (3)

Answer: D

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19. A car is negotiating a curved road of radius R. The road is banked at angle θ. The coefficeint of friction between the tyres of the car and the road is μ_s. The maximum safe velocity on this road is

A. $\left[(Ag)\dfrac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}\right]^{\frac{1}{2}}$

B. $\left[(Ag)\dfrac{\mu_s}{1+\tan\theta}\right]^{\frac{1}{2}}$

C. $\left[(Ag)^2\dfrac{\tan\theta}{1-\mu_s\tan\theta}\right]^{\frac{1}{2}}$

D. $\left[(Ag)\dfrac{\mu_s-\tan\theta}{1+\mu_s\tan\theta}\right]^{\frac{1}{2}}$

Answer: A

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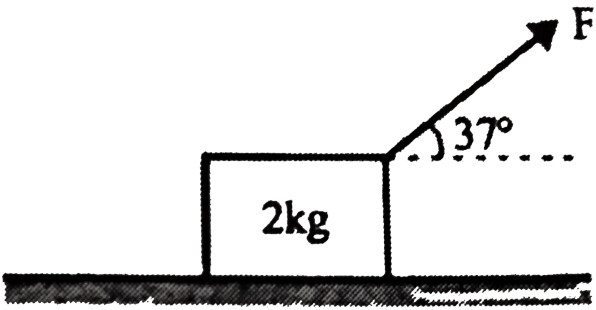
20. A block of mass 2 kg is kept on a rough horizontal floor an pulled with a force F. If the coefficient of friction is 0.5. then the minimum force required to move the block is :-



A. 100/11 N

B. 8 N

C. 10 N

D. 100/8 N

Answer: A

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21. A car is moving in a horizontal level of circular track with uniform speed of $10\frac{m}{s}$. If radius of circular path is 50 m then the

minimum coefficient of friction to avoid over turning is

A. 0.3

B. 0.5

C. 0.1

D. 0.2

Answer: D

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22. A car has to take a safe circular turn on horizontal flat rough road of radius 200 m. If the coefficient of friction between the tyres and road is 0.1 ,then maximum speed of car would be(All are in SI units)

A. $\sqrt{20g}$

B. $\sqrt{10g}$

C. $\sqrt{g}$

D. $\frac{g}{\sqrt{20}}$

Answer: A

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23. A particle of mass m is moving on a circular path of radius r with uniform speed v , rate of change of linear momentum is

A. 1 m/s

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

C. $2\sqrt{2}$ m/s

D. Zero

Answer: B

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24. A Particle of mass 'M' moves in a uniform circular path of radius 'r' with a constant speed 'v' then its centripetal acceleration is .

A. $\frac{v}{r}, \frac{v^2}{r}$

B. $Zero, \frac{dv}{dt}$

C. $\frac{v^2}{r}, \frac{dv}{dt}$

D. $\frac{v^2}{z} ero$

Answer: C

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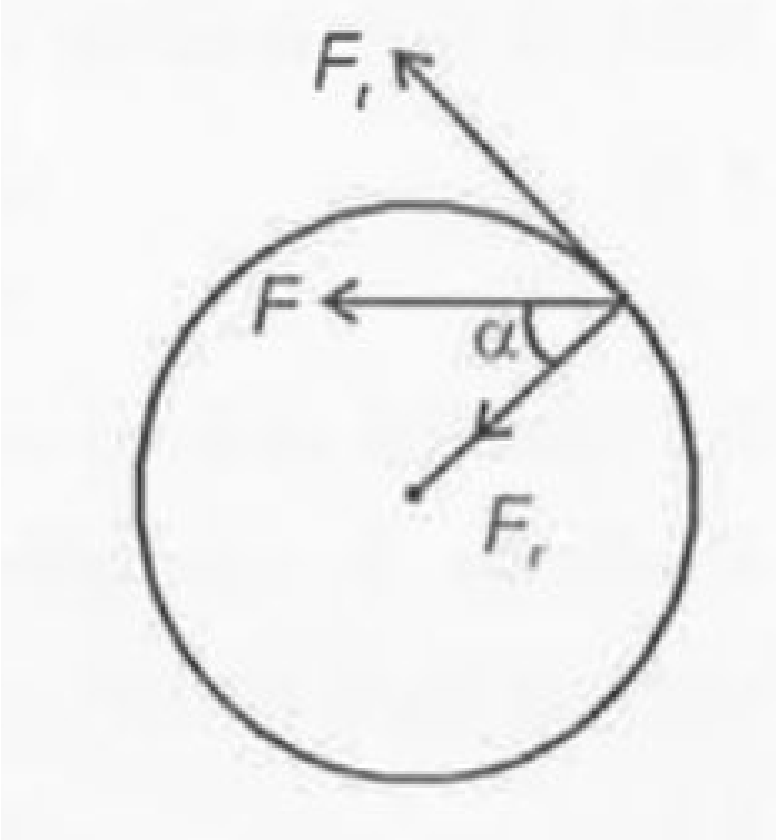
25. A particle of mass m is moving in a circle of radius (r) with changing speed (v) the direction of centripetal force and tangential

force are shown below the value of α is



A. $\alpha = \tan^{-1}\left(\frac{\frac{dv}{dt}}{\frac{v^2}{r}}\right)$

B. $\alpha = \cos^{-1}\left(\frac{\frac{dv}{dt}}{\frac{v^2}{r}}\right)$

C. $\alpha = \sin^{-1}\left(\frac{\frac{v^2}{r}}{\frac{dv}{dt}}\right)$

D. $\alpha = \tan^{-1}\left(\frac{\frac{v^2}{r}}{\frac{dv}{dt}}\right)$

Answer: A

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26. In a conical pendulum a small mass is revolving in horizontal circle with constant speed v at the end of the cord of length L that makes an angle θ with the vertical as shown . The value of angle θ would be (where r is the

radius of circle)

A. $\theta = \tan^{-1}\left(\frac{rg}{v^2}\right)$

B. $\theta = \tan^{-1}\left(\frac{v^2}{rg}\right)$

C. $\theta = \tan^{-1}\left(\frac{v^2}{2rg}\right)$

D. $\theta = \tan^{-1}\left(\frac{v}{r^2 g}\right)$

Answer: B

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27. Which of the following statement is correct

A. The centripetal force must be acting on the particle moving in a circular path

B. If no tangential component of thr force is acting on particle moving in circular path, then speed is changing

C. If no tangential component of force is acting on particle moving in a circular path ,the speed of particle changes

D. Both (1) and (3)

Answer: D

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28. Two particles of equal masses are revolving in circular paths of radii r_1 and r_2 respectively with the same speed. The ratio of their centripetal foces is

A. $\frac{r_2}{r_1}$

B. $\sqrt{\frac{r_2}{r_1}}$

C. $\left(\frac{r_1}{r_2}\right)^2$

D. $\left(\frac{r_2}{r_1}\right)^2$

Answer: A

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Exercise

1. The r.m.s speed of the molecules of an ideal gas Is V_0 If pressure of the gas is halved but

temperature is kept constant then r.m.s. speed of the gas molecule will be

A. $\frac{V_0}{2}$

B. $2V_0$

C. $\sqrt{2}V_0$

D. V_0

Answer:

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2. One mole of monatomic gas $\left[\gamma = \frac{5}{3}\right]$ is mixed with two moles of polyatomic gas $\left[\gamma = \frac{4}{3}\right]$ The value of γ for the mixture will be (γ Is adiabatic constant)

A. $\frac{7}{5}$

B. $\frac{8}{5}$

C. $\frac{5}{2}$

D. $\frac{7}{3}$

Answer:

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3. E is the average rotational kinetic energy per mole of a diatomic gas all the absolute temperature T then the universal gas constant is given by

A. $3E/2T$

B. $2E/3T$

C. E/T

D. $2E/5T$

Answer:

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4. Internal energy of n moles of helium at temperature $T_1 K$ is equal to the internal energy of 2n moles of oxygen gas at temperature $T_2 K$ then the value of $\frac{T_1}{T_2}$ will be

A. $\frac{5}{3}$

B. $\frac{10}{3}$

C. $\frac{4}{3}$

D. $\frac{8}{3}$

Answer:

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5. The expansion of unit mass of a perfect gas at constant pressure as shown in the figure, then b and a

A. b = volume, a = temperature ($\in^0$ C)

B. b = volume, a = temperature (in K)

C. a = volume, b = temperature (in ^{o}C)

D. a = volume, b =temperature (in K)

Answer:

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6. Volume versus temperature (V-T) graph of an ideal gas of equal number of moles is plotted as shown in the figure. Choose the correct alternative.

A. $P_1 = P_2 P_3 = P_4$ and $P_3 < P_1$

B. $P_1 = P_2 P_3 = P_4$ and $P_4 < P_2$

C. `P_1 = P_2= P_3 = P_4

D. $P_2 > P_4 > P_1 > P_3$

Answer:

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7. The average kinetic energy per molecule of an ideal nonlinear polyatomic gas at the room

temperature T_0 will be (k is Boltzmann constant, neglect vibrational modes)

A. $\frac{3}{2}(kT_0)$

B. $\frac{5}{2}(kT_0)$

C. $3(kT_0)$

D. $\frac{1}{2}(kT_0)$

Answer:

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8. If speeds of the four molecules of an ideal gas are v, 3v, 5v and 7v respectively, then the mean square speed of the molecules will be

A. $4v^2$

B. $2\sqrt{v}$

C. $21v^2$

D. $\sqrt{21}v$

Answer:

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9. An ideal gas is in a container of volume V_0 at pressure P_0 If the same amount of gas is in container of volume $3V_0$ at pressure P_0. then the ratio of final average translational kinetic energy to the initial average translational kinetic energy of the gaseous molecule is

A. $9:1$

B. $3:1$

C. $1:3$

D. $1:2$

Answer:

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10. If the intensity of sound increased by a factor of 20 then the sound level increases in decibels by the

A. 12 dB

B. 14.77 dB

C. 13 Db

D. 10 dB

Answer:

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11. An open organ pipe of length L vibrates in its second harmonic mode. The correct statement about the Pressure variation is

A. Minimum at two end

B. Maximum at a distance $\frac{L}{4}$ from any end

C. Maximum at a distance $\frac{L}{2}$ from any end

D. Minimum at a distance $\frac{L}{2}$ from any end

Answer:

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12. The equation of standing wave in a stretched string is given by $\left\{y = 2\sin\left[\frac{\pi}{2}(x)\right]\cos(20\pi t)\right\}$ where x and y are in meter and t is in second. Then minimum separation between two particle which are at the antinodes and having same phase will be

A. 2 m

B. 6 m

C. 3 m

D. 4 m

Answer:

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13. Two plane progressive waves are given as $(y_1 = A_1 \sin)$ $(Kx - omrgat)$ and $[y_2 = A_2 \sin(Kx - \omega t + \phi)]$ are

superimposed. The resultant wave will show which of the following phenomenon?

A. Standing wave

B. Beats

C. Interference

D. Both (1) & (3)

Answer:

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14. Two coherent plane progressive waves are represented by $[y_1 = \sin(200\pi t - 100\pi x)]$ and $[y_2 = 2\sin(200\pi t - 100\pi x + \phi)]$ are superimposed on each other, Then the ratio of maximum and minimum intensity of the resultant wave will be

A. $2:1$

B. $9:1$

C. $4:1$

D. $4:3$

Answer:

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15. On the superposition of two waves $[y_1 = 3\sin(50\pi t - 20x)]$ and $\left[y_2 = 3\sin\left(50\pi t - 20x + \left(\frac{\pi}{3}\right)\right]\right.$ the equation resultant wave will be

A. $\left[y = 3\sqrt{3}\sin\left\{50\pi t - 20x + \left(\frac{\pi}{6}\right)\right]\right.$

B. $\left[y = 3\sqrt{3}\sin\left\{50\pi t - 20x + \left(\frac{\pi}{3}\right)\right]\right.$

C. $\left[y = 3\sin\left\{50\pi t - 20x + \left(\frac{\pi}{3}\right)\right]\right.$

D. $\left[y = 3\cos\left\{50\pi t - 20x + \left(\frac{\pi}{6}\right)\right]\right.$

Answer:

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16. The characteristics of sound with the help of which we can distinguish between a SHRILL note and a GRAVE note is

A. Loudness

B. Pitch

C. Quality

D. Intensity

Answer:

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17. Doppler shift in frequency of sound is independent of (Source is moving on the straight line joining source and observer)

A. The distance between the source and listener

B. The velocity of the listener

C. The velocity of source

D. The velocity of sound

Answer:

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18. The change in entropy of the melting ice of 1kg at 273 kelvin is (given L= 80 cal/gm) ?

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19. The apparent frequency of the whistle of an engine changes in the ratio 6:5 as the engine passes a stationary observer. If the velocity of the sound is 330 m/s then the velocity of the engine will be

A. 25 m/s

B. 60 m/s

C. 30 m/s

D. 80 m/s

Answer:

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20. In determination of velocity of sound in air using resonance column tube, radius of cylindrical tube is 1 cm and frequency of tuning fork is 256 Hz. If velocity of sound is

340 m/s then length of air column in the tube when first resonance occurs, is

A. 33.2 cm

B. 32.0 cm

C. 32.6 cm

D. 33.8 cm

Answer:

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21. Two identical stretched wires have a fundamental frequency 200 vibrations per second when kept under the same tension. What percentage increase in tension in one wire will produce 4 beats per second when both wire vibrates together (AT < < T)

A. $6\ \%$

B. 0.04

C. 0.08

D. 0.02

Answer:

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22. Two sound waves of wavelength 1 m and 1.02 m produces 16 beats in 2 s in a medium then the velocity of the sound in that medium is

A. 408 m/s

B. 308 m/s

C. 320 m/s

D. 340 m/s

Answer:

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23. The frequency of the 5th harmonic of a pipe closed at one end is 680 Hz. If the speed of the sound is 340 m/s then the length of the pipe will be

A. 125 cm

B. 75 cm

C. 62.5 cm

D. 37.5 cm

Answer:

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24. The fundamental frequencies of two open pipes of different length are 200 Hz and 300 Hz. If they are joined to form a longer pipe

then the frequency of the third harmonic of the longer pipe will be

A. 600 Hz

B. 480 Hz

C. 540 Hz

D. 360 Hz

Answer:

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25. A wire of length 1 m and mass density $4x10^3k\frac{g}{m^3}$ is stretched between two clamps and subjected to an extension of $3.6x10^{-4}$ m. If Young's modulus of the wire is $\left(4x10^{10}\frac{N}{m^2}\right)$ then the frequency of the first overtone of the transverse vibration in the wire is

A. 30 Hz

B. 60 Hz

C. 50 Hz

D. 40 Hz

Answer:

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26. A wave represented by a given equation $[y(x, t) = a \sin(\omega t - kx)]$ superimposes on another wave giving a stationary wave having antinode at x = 0 then the equation of the another wave is

A. $[y = -a \sin(\omega t - kx)]$

B. $[y = a\sin(\omega t + kx)]$

C. $[y = -a\sin(\omega t + kx)]$

D. $[y = -a\cos(\omega t + kx)]$

Answer:

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27. In a standing wave 4 nodes and 3 antinodes are formed between two fixed end of string of length 6 m.Then the wave length of the standing wave is

A. 2 m

B. 3 m

C. 5 m

D. 4 m

Answer:

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28. The velocity of sound is generally lesser in gases than solids because as compared to gases

A. The elasticity of solid is very high

B. The density of solids is low and elasticity is high

C. Both density and elasticity of solid is very low

D. The density of solid is high and elasticity is low

Answer:

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29. A uniform rope of length 12 m and mass 4 kg is hung vertically from a rigid support transverse wave pulse is produced at lower end. The speed of the wave pulse al x = 2.5 m from lower and will be kg=10 m/s)`

A. 10 m/s

B. 5 m/s

C. 7.5 m/s

D. 2.5 m/s

Answer:

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30. The speed of sound in oxygen gas at temperature 27°C is v_0. If sound travels in hydrogen gas then at what temperature the speed of sound becomes $2v_0$?

A. 75 K

B. 200 K

C. 150 K

D. 100 K

Answer:

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31. A transverse wave of amplitude 2 m, wavelength 4 m and frequency 6 Hz is propagating in a string toward positive y-direction. The equation of the wave may be (y is in m and t is in s)

A. $[X = 2\sin(0.5\pi y + 12\pi t)]$ m

B. $[X = 2\sin(\pi y - 6\pi t)]$ m

C. $[X = 2\sin(\pi y + 6\pi t)]$ m

D. $[X = 2\sin(0.5\pi y - 12\pi t)]$ m

Answer:

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32. A depth measuring device emits a signal of 20000 vibrations per second which has speed of 1000 m/s in water. The pulse is reflected from the ocean bed and returns to the device

in 0.5 s after the signal is emitted. The depth of the ocean is

A. 500 m

B. 750 m

C. 250 m

D. 1000 m

Answer:

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33. A system absorbs 1500 joule of energy as heat and produces 500 joule of work .the change in internal energy of the system will be :

A. 1500 J

B. 100J

C. 0 J

D. 1000 J

Answer:

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34. The angular frequency of a particle in a progressive wave in an elastic medium is 50π rad/s and it is moving with velocity of 150 m/s. The phase difference between two particles separated by a distance 30m at the same instant will be

A. πrad

B. $3\frac{\pi}{4} rad$

C. $10\pi rad$

D. $6\pi rad$

Answer:

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35. Choose the correct statement about the mechanical wave.

A. It requires medium for its propagation

B. Are transverse only

C. Can be both longitudinal or transverse

D. Both (1) and (3)

Answer:

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36. The displacement equation of a travelling wave puise is given as `[y= 10/ (X^2 + 12xt + 36t^2 + 25) (where x and y are in meter). The speed and direction of propagation of the wave pulse is

A. 6 m/s along positive x-axis

B. 6 m/s along negative x-axis

C. 3 m/s along positive x-axis

D. 3 m/s along negative x-axis

Answer:

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37. The time period of simple pendulum inside a stationary lift is T. If lift starts accelerating upwards with the acceleration of g/2, then the

new time period of the simple pendulum will be

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

B. $\sqrt{\frac{2}{3}}T$

C. T

D. $\frac{\sqrt{3}}{2}T$

Answer:

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38. The force on a body executing SHM is 4 N when the displacement from mean position is 2 cm. If amplitude of oscillation is 10 cm, then the maximum kinetic energy associated with the SHM will be

A. 1 J

B. 4 J

C. 2 J

D. 3 J

Answer:

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39. The differential equation representing the S.H.M. of particle is $\left[16\frac{d^2y}{dt^2} + 9y = 0\right]$ If particle is at mean position initially, then time taken by the particle to reach half of its amplitude first time will be

A. $4\frac{\pi}{9}s$

B. $5\frac{\pi}{9}s$

C. $\frac{\pi}{3}s$

D. $2\frac{\pi}{9}s$

Answer:

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40. A spring of force constant k is connected with centre of a disc of mass m and radius R System is placed on honzontal surface and other end of spring is fixed with a vertical wall as shown in a figure. If there is sufficient

friction for pure rolling then time period of oscillation of the disc will be

A. $2\pi\left[\sqrt{2\frac{m}{3}k}\right]$

B. $\pi\left[\sqrt{2\frac{m}{3}k}\right]$

C. $2\pi\left[\sqrt{3\frac{m}{2}k}\right]$

D. $\pi\left[\sqrt{3\frac{m}{2}k}\right]$

Answer:

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41. A particle of mass m executing SHM with angular frequency ω_0 and amplitude A_0, The graph of velocity of the particle with the displacement of the particle from mean position will be$(\omega_0 = 1)$

A. Straight line

B. Ellipse

C. Circle

D. Parabola

Answer:

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42. A spring of force constant 'k' is cut into four equal parts one part is attached with a mass m. The time period of oscillation will be

A. $\pi\sqrt{\frac{m}{k}}$

B. $2\pi\sqrt{\frac{m}{2k}}$

C. $\left(\frac{\pi}{2}\right)\sqrt{\frac{m}{2k}}$

D. $2\pi\sqrt{\frac{m}{k}}$

Answer:

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43. Acceleration displacement (a-x) graph of a particle executing S.H.M. is shown in the figure. The frequency of oscillation is $(\tan\theta = 8)$

A. $\frac{2}{\pi}Hz$

B. $\frac{\sqrt{2}}{\pi}Hz$

C. $2\frac{\sqrt{2}}{\pi}Hz$

D. $\frac{1}{\pi}Hz$

Answer:

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44. Choose the incorrect statement among the following

A. At the extreme position, acceleration of the simple harmonic oscillator is maximum

B. At the mean position speed of the harmonic oscillator is maximum simple

C. In the simple harmonic motion, the direction of velocity is always in the direction of acceleration

D. Both (1) and (2)

Answer:

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45. A particle is moving along the y-axis according to the equation $[y = a_0 \sin(3\omega t)]$. The motion is simple harmonic

A. With time period $\left(2\frac{\pi}{3\omega}\right)$

B. With amplitude $3a_0$,

C. With frequency $\left(\frac{3\omega}{\pi}\right)$

D. Both (1) and (2) are correct

Answer:

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46. If two objects A and B of same volume and same density are dropped from a height of 200 m, then (neglect air resistance)

A. Both will reach together on earth

B. A will reach first on earth

C. B will reach first on earth

D. A will gain larger speed than B on reaching the earth

Answer:

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47. The dimensions of Planck's constant is identical to

A. Linear momentum

B. Angular momentum

C. Torque

D. Angular velocity

Answer:

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48. A fixed mass of an ideal gas is compressed in such a manner that its pressure and volume can be related as P^3V^3 = constant. During this process, temperature of the gas is.

A. increased

B. Decreased

C. First increases then decreases

D. Remains constant

Answer:

49. Rain is falling vertically downwards with respect to ground. If a girl running on the ground with speed 3 km/h observes the rain is falling with speed 5 km/h then actual speed of rain is

A. 3 km/h

B. 4 km/h

C. 5 km/h

D. 7 km/h

Answer:

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50. The variation of force (F) acting on a particle of mass 800 g with position (x) is as shown in figure. The time period of oscillation of the particles is

A. $\left(\frac{\Pi}{10}\right)$ S

B. (2π) S

C. $\left(\frac{\Pi}{4}\right)$ S

D. $(2\pi\omega)$ S

Answer:

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51. If the equation of a travelling wave is given as y = 40 cos (1600t + 6x), (where y is in millimeter, t is in second and x is in meter), then ratio of the wave speed to the maximum particle speed will be

A. $10:3$

B. $6:25$

C. $25:6$

D. $3:10$

Answer:

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52. Five moles of oxygen gas is heated from 40°C to 70°C at constant pressure Heat given to the gas will be (given R=2 cal/mol K)

A. 525 cal

B. 750 cal

C. 1500 cal

D. 1050 cal

Answer:

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53. The quantities P and Q are related by $\frac{P}{Q} = \mu$ where μ is the linear mass density

and Q is specific latent heat. Then dimension of P will be same as

A. Pressure

B. Work

C. Momentum

D. Force

Answer:

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54. A body of mass 0.5 kg initially at rest is accelerating , due to a time dependent force $\left[\overrightarrow{F} = t\hat{i} + \sqrt{t}\hat{j}\right]$ N then instantaneous power developed due to this force at t = 3 s will be

A. 29 W

B. 39 W

C. 49 W

D. 59 W

Answer:

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55. Force-time graph of a particle of mass 6 kg is shown in figure, then change in linear momentum during t = 0 to t = 10 s is

A. 25 N s

B. 75 N s

C. 15 N s

D. $-75Ns$

Answer:

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56. Two stones A and B are whirled in different horizontal circular paths. Stone A is 3 times heavier than B and moving in radius twice as that of radius of B and with speed one third as that of the speed of B. The ratio of centripetal forces acting on A and B will be

A. $2:3$

B. $3:2$

C. $1:6$

D. $6:1$

Answer:

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57. Three blocks of masses 3 kg, 5 kg and 4 kg are connected with massless strings is moving downward with the help of force F with constant velocity as shown in figure. The tension (T) in the string connecting 3 kg and 5 kg will be $\left(g = 10\frac{m}{s^2}\right)$

A. 100 N

B. 90 N

C. 120 N

D. 80 N

Answer:

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58. A container containing Ice at 0°C and having outside surface area $\left(1.6m^2\right)$ and thickness 1 cm is placed in a boiling water if 2

kg of ice melts in 30 minute, then themal conductivity of material of container is nearly (Given: Latent heat of fusion of ice = 3.36 x 10^5 J/kg)

A. 0.08 W/m°C

B. 0.06 W/m°C

C. 0.04 W/m°C

D. 0.02 W/m°C

Answer:

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59. A Carnot engine, used as refrigerator absorbs 380 J energy in one cycle from low temperature reservoir. If efficiency of this Carnot engine is 5% then amount of work done on refrigerator per cycle is

A. 10 J

B. 20 J

C. 30 J

D. 40 J

Answer:

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60. The power radiated by a blackbody is P at a certain temperature. If power radiated by this body becomes $\frac{1}{16}th$ the times. then wavelength corresponding to maximum intensity becomes

A. 2 times

B. $\frac{1}{2}\times$

C. 4 times

D. $\frac{1}{4}\times$

Answer:

Watch Video Solution

61. The degree of freedom of mixture of two ideal gases having moles n_1 and $n,_2$ and degree of freedom f_1 and f_2 respectively, is

A. $\left[f_{mix}=\frac{n_1f_1+n_2f_2}{\frac{1}{n_1}+\frac{1}{n_2}}\right]$

B. $\left[f_{mix} = \frac{n_1 f_2 + n_2 f_1}{n_1 + n_2}\right]$

C. $\left[f_{mix} = \frac{n_1 f_1 + n_2 f_2}{n_1 + n_2}\right]$

D. $\left[f_{mix} = \left(\frac{n_1}{f_1}\right) + \frac{\frac{n_2}{f_2}}{n_1 + n_2}\right]$

Answer:

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62. 0.5 moles of an ideal monoatomic gas undergoes a thermodynamic process from A to B as shown in figure. The change in internal

energy of the gas during the process from A to B is

A. -7 kJ

B. – 21 kJ

C. - 28 kJ

D. - 42 kJ

Answer:

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63. At the height h above the earth's surface the acceleration due to gravity is same as that of depth 5 km below the surface of earth, then h will be nearly

A. 10 km

B. 2.5 km

C. 15 km

D. 20 km

Answer:

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64. A body of mass m is thrown from a he equal to radius of earth (A) from earth's surface. The change in potential energy when it reaches to a height equal to 2R from earth's surface is

A. $\frac{1}{6}mgR$

B. $\frac{2}{3}mgR$

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

D. $\frac{3}{2}mgR$

Answer:

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65. Let the sun contracts due to self-gravity and it becomes a black hole. If the mass of sun is $2x10^{30}$ kg, then possible radius of sun to behave as a black hole is

A. 5200 m

B. 3000 m

C. 2964 m

D. 4533 m

Answer:

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66. If a cup of tea cools from 80°C to 72°C in 5 minutes and from 72 C to 66°C in the next 5 minutes, then temperature of surrounding is

A. 43°C

B. 46°C

C. 48°C

D. 50°C

Answer:

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67. A wire of length is stretched by a force F to cause an extension x. Another wire of same material and same volume but 50% larger in length than the first wire, the force required for the same extension will be

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

B. $\frac{2}{3}F$

C. $\frac{9}{4}F$

D. 4/9 F

Answer:

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68. A satellite revolves in a circular orbit at a height of $1.6x10^6$ m above the surface of earth earth's radius is $6.4x10^6$ m. then the

orbital speed of the satelite will be nearly $\left(g = 9.8\frac{m}{s^2}\right)$

A. 5 km/s

B. 7 km/s

C. 9 km/s

D. 11 km/s

Answer:

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69. The extra pressure required to decrease the volume of a liquid of Buik modulus 2.5 GPa by 0.01% is

A. 150 kPa

B. 225 kPa

C. 250 kPa

D. 125 kPa

Answer:

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70. A vertical U shaped tube of uniform cross-section contains mercury in both limbs. Another liquid of density $3.4\frac{g}{c}m^3$ is poured In one limb of column length 4 cm as shown in figure. Then difference (h) between the upper level of liquid in both the limbs is $\left(densityofmercury = 13.6\frac{g}{c}m^3\right)$

A. 1 cm

B. 2 cm

C. 3 cm

D. 4 cm

Answer:

Watch Video Solution

71. Twenty seven similar mercury drops are falling through water with terminal velocity 4 cm/s. If the drops combine to form a single drop, then terminal velocity of this bigger drop in water will be

A. 12 cm/s

B. 40 cm/s

C. 108 cm/s

D. 36 crm/s

Answer:

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72. Weight of a solid is 250 g in air, 50 g in unknown liquid and 150 g in water. The relative density of solid and the unknown liquid are respectively

A. 2 ,5/4

B. 5/2, 2

C. 9/2 ,2

D. 9/2 ,3

Answer:

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73. A sample of 0.5 g water at 100°C and 1 atm pressure requires 270 cal heat energy to convert to steam at 100°C. If at the same

pressure, volume of the steam produced is 835.5 cc then change in internal energy of the sample is (1 cal = 4.2 J, 1 atm $10^5 \frac{N}{m^2}$)

A. 1050.5 J

B. 2000 J

C. 500 J

D. 1550.5 J

Answer:

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74. The velocity - time (V - t) graph of an object of mass 2 kg is as shown in figure while it is moving on a rough horizontal surface. The coefficient of friction between object and the surface is $\left(g = 10\frac{m}{s^2}\right)$

A. 0.1

B. 0.7

C. 0.2

D. 0.5

Answer:

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75. Four forces are acting on a body as shown in figure. The magnitude of resultant of the forces is

A. 16 N

B. 8 N

C. 20 N

D. 4 N

Answer:

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76. A mass m is connected to a massless rod of length l(and is free to rotate in vertical plane about hinged end of rod. If rod is released from horizontal position and mass "m" collides inelastically at lowest position with identical mass m, as shown in the figure, then the maximum height attained by combined mass will be

A. l/4

B. l/2

C. 3l/4

D. l/8

Answer:

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77. An object having kinetic energy of 50 J is moving with linear momentum $\left[\bar{p} = \left(3\hat{j} - 4\hat{j}\right)\right]$ kg m/s. The speed of moving object will be

A. 5 m/s

B. 10 m/s

C. 15 m/s

D. 20 m/s

Answer:

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78. The tension in the cord connected to motor is 15000 N and mass of the lift is 1400 kg. f mass m= 100 kg is inside the connected

with a massless string as shown in tigure, then tension in the string connected with m is $\left(g = 10\frac{m}{s^2}\right)$

A. 1000 N

B. 100 N

C. 2000 N

D. 200 N

Answer:

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79. A pump of power P ejects M kg water per second through a horizontal pipe. If power of the pump is doubled, then using the same pipe, amount of water ejected in one second will be

A. 2 M kg

B. 8 M kg

C. $\frac{(2)^1}{3} MKg$

D. $\frac{(2)^2}{3} MKg$

Answer:

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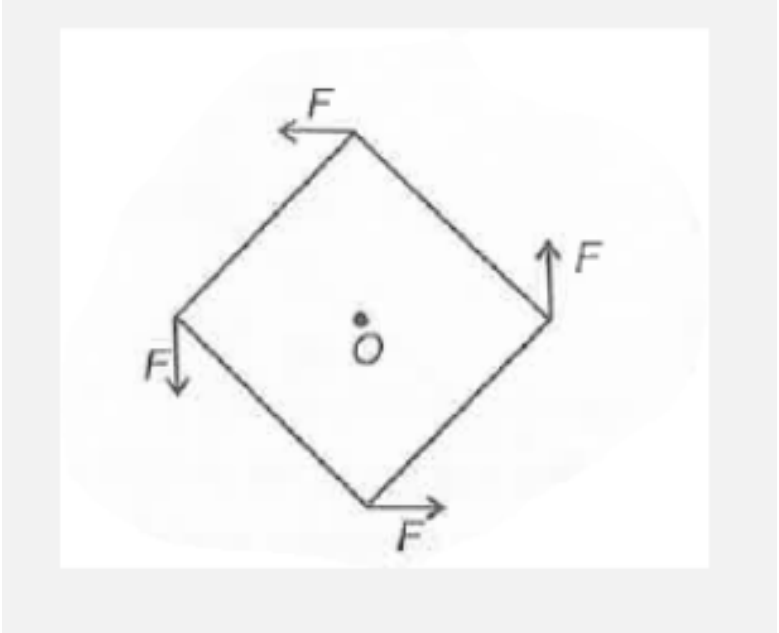
80. Forces of equal magnitude of 0.5 N are acting on a square plate of side $\sqrt{2}$ m and mass 1 kg as shown in figure. The net torque on the square plate about centre O will be



A. 4N m

B. $2\sqrt{2}$ N m

C. $4\sqrt{2}$ N m

D. 2 N m

Answer:

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81. IF linear mass density a rod of length 2 m is changing with position as $[\lambda = (3x + 2)]$ kg

m then mass of the rod with one end at origin wil be

A. 10 kg

B. 6 kg

C. 2 kg

D. 12 kg

Answer:

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82. Which of the following statements is correct?

A. Centre of mass of a body can be considered at any general point

B. Radius of gyration depends on mass of rigid body

C. There must be some mass present at location of centre of mass

D. Centre of mass and centre of gravity may be at same point

Answer:

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83. A solid and a hollow sphere are released from the top of a sufficiently rough inclined plane. The solid sphere has same mass but its radius is half of the radius of hollow sphere. Both are performing pure rolling Which of the

following statements is correct regarding their kinetic energy when they reach at the bottom of plane? (K = Kinetic energy)

A. $K_hollow < K_solid$

B. $K_hollow = K_solid$

C. $K_hollow = 2K_solid$

D. $K_hollow > K_solid$

Answer:

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84. A disc of mass 3 kg and radius 0.5 m is placed on a horizontal frictionless table. With the help of a cue we gives a horizontal impulse of 15 Ns to the disc at topmost point then velocity of centre of mass will be

A. 5 m/s

B. 10 m/s

C. 15 m/s

D. 20 m/s

Answer:

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85. A uniform rod length is l hinged at A and suspended with vertical string as shown in figure it string is cut then acceleration of centre of mass at this instant will be $\left(g = 10\frac{m}{s^2}\right)$

A. $8.5\frac{m}{s^2}$

B. $6\frac{m}{s^2}$

C. $7.5\frac{m}{s^2}$

D. $8\frac{m}{s^2}$

Answer:

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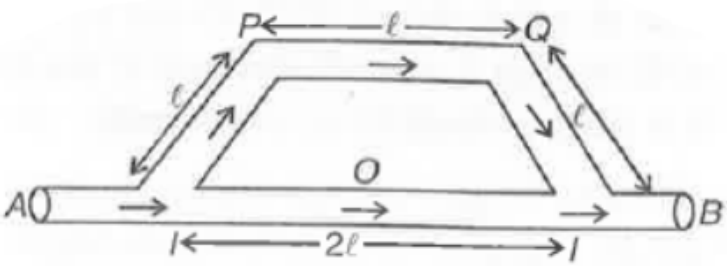
86. Sound wave from a source A, follows two paths AOB and APQB in a tube as shown in figure. For silence at B, possible wavelength of sound will be



A. $3\frac{l}{5}$

B. 2l/5

C. 5l/7

D. 8l/3

Answer:

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87. Velocity of sound in air is 320 m/s. For an organ pipe closed at one end of length 2 m the resonating frequency may be

A. 80 Hz

B. 160 Hz

C. 240 Hz

D. 360 HZ

Answer:

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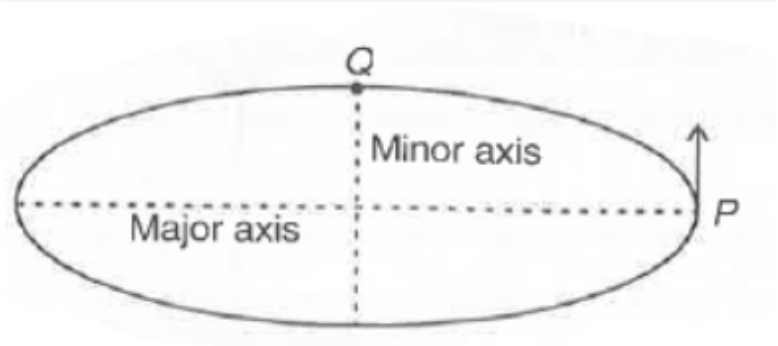
88. A train moving with constant speed 40 m/s in an elliptical path in anticlockwise direction, blows horn at point P. An observer standing at

point 'Q' receives the horn sound of frequency 2000 Hz. If ratio of minor to major axis is $(1:\sqrt{3})$ and speed of sound in air is 320 m/s, then true frequency of sound will be



A. 2000 Hz

B. 2100 Hz

C. 1875 Hz

D. 1675 Hz

Answer:

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89. A ball is projected from origin at time t= 0. The x and A y coordinates of its displacement are given by $\left(x = 4t^2\right)$ and y = (3t - 5). Then its instantaneous velocity at any time t is

A. $\left(8\hat{j} + 3\hat{j}\right)$

B. $\left(8t\hat{j} + 3\hat{j}\right)$

C. $\left(4t\hat{j} - 5\hat{j}\right)$

D. $\left(4\hat{j}-3\hat{j}\right)$

Answer:

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90. A mass m is moving with velocity $(\bar{v})$ along a line y = x as shown in the figure. Which one is correct statement about angular momentum L_A, and L_B about the points A and B respectively?

A. $\left[\overline{L_A}=\overline{L_B}\right]$

B. $\left[\left|\overline{L_A}\right| \neq \left|\overline{L_B}\right|\right]$

C. $\left[\left|\overline{L_A}\right| \neq \left|\overline{L_B}\right|\right] = 0$

D. $\left[\overline{L_A}\right\} \neq \overline{L_B}]$

Answer:

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