PHYSICS

BOOKS - CP SINGH PHYSICS (HINGLISH)

NEET PREVIOUS YEAR

Solved Quesitons

1. If energy (E) , velocity (V) and time (T) are chosen as the fundamental quantities , the dimensions formula of surface tension will be

A. $[EV^{-1}T^{-2}]$

B. $[EV^{-2}T^{-2}]$

C. $[E^{-2}V^{-1}T^{-3}]$

D. $\left[EV^{-2}T^{-1}\right]$

Answer:

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2. A particle of unit mass undergoes one-dimensional motion such that its velocity varies according to

$v(x) = \beta x^{-2n}$

where β and n are constant and x is the position of the particle. The acceleration of the particle as a function of x is given by.

A. $-2nb^2x^{-4n-1}$

B. $-2nb^2x^{-2n+1}$

C. $-2nb^2x^{-4n+1}$

D. $-2nb^2x^{-2n-1}$

Answer:

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3. A ship A is moving Westwards with a speed of $10kmh^{-1}$ and a ship B 100km South of A is moving northwards with a speed of $10kmh^{-1}$. The time after which the distance between them shortest is

A. $5h$

B. $5\sqrt{2}h$

C. $10\sqrt{2}h$

D. $0h$

Answer:

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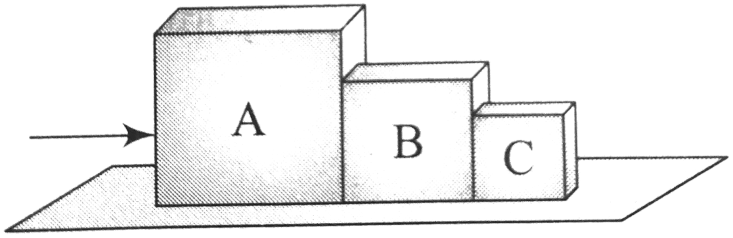
4. Three blocks A , B and C of masses $4kg$, $2kg$ and $1kg$ respectively are in contact on a frictionless surface, as shown. If a force of $14Nisappliedonthe$4kg $block, thenthecontactf$ or $cebetween$A and B` is.



A. $6N$

B. $8N$

C. $18N$

D. $2N$

Answer:

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5. A block A of mass m_1 rests on a horizontal table. A light string connected to it passes over a frictionless pulley at the edge of table and from its other end another block B of mass m_2 is suspended. The coefficient of knetic friction between the block and table is μ_k . When the block A is sliding on the table, the tension in the string is.

A. $\frac{(m_2 - \mu_k m_1)g}{(m_1 + m_2)}$

B. $\frac{m_1 m_2(1 + \mu_k)g}{(m_1 + m_2)}$

C. $\frac{m_1 m_2(1 - \mu_k)g}{(m_1 + m_2)}$

D. $\frac{(m_2 + \mu_k m_1)g}{(m_1 + m_2)}$

Answer:

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6. A bolck of mass $10kg$ is moving in x-direction with a constant speed of $10m/s$. it is subjected to a retardeng force $F = -0.1xJ/m$. During its travel from $x = 20m$ to $x = 30m$. Its final kinetic energy will be .

A. $450J$

B. $275J$

C. $250J$

D. $475J$

Answer:

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7. Two similar springs P and Q have spring constant K_P and K_Q such that $K_P > K_Q$. They are stretched, first by the same amount (case a), then the same force (case b). The work done by the spring W_P and W_Q are related as, in case (b), respectively

A. $W_P = W_Q, W_P = W_Q$

B. $W_P > W_Q, W_Q > W_P$

C. $W_P < W_Q, W_Q < W_P$

D. $W_P = W_Q, W_P > W_Q$

Answer:

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8. A partical of mass m is driven by a machine that deleveres a constant power k watts. If the partical starts from rest the force

on the partical at time t is

A. $\sqrt{mk}t^{-1/2}$

B. $\sqrt{2mk}t^{-1/2}$

C. $\frac{1}{2}\sqrt{mk}t^{-1/2}$

D. $\sqrt{\frac{mk}{2}}t^{-1/2}$

Answer:

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9. Two particles of masses m_1, m_2 move with initial velocities u_1 and u_2. On collision, one of the particles get excited to higher level, after absording enegry. If final velocities of particles be v_1 and v_2 then we must have

A. $\frac{1}{2}m_1u_1^2 + \frac{1}{2}m_2u_2^2 = \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2 - \varepsilon$

B. $\frac{1}{2}m_1u_1^2 + \frac{1}{2}m_2u_2^2\varepsilon = \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2$

C. $\frac{1}{2}m_1^2u_1^2 + \frac{1}{2}m_2^2u_2^2\varepsilon = \frac{1}{2}m_1^2v_1^2 + \frac{1}{2}m_2^2v_2^2$

D. $m_1^2 + m_2^2u_2 - \varepsilon = m_1^2v_1 + m_2^2v_2$

Answer:

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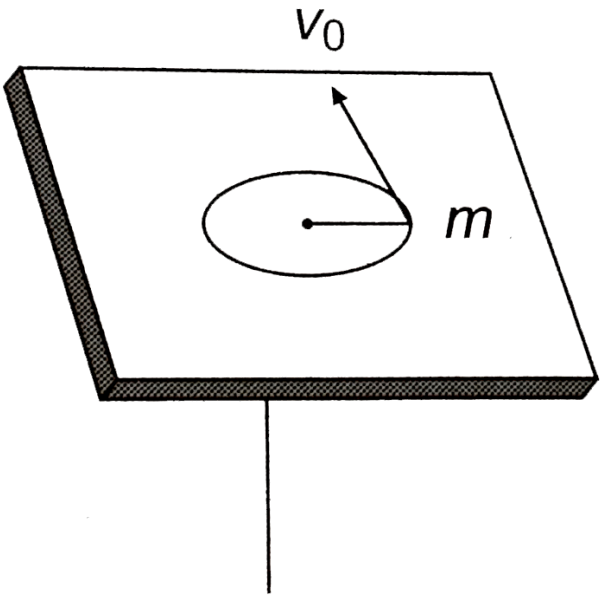
10. A mass m moves in a circles on a smooth horizontal plane with velocity v_0 at a radius R_0. The mass is atteched to string which passes through a smooth hole in the plane as shown.

The tension in string is increased gradually and finally m moves

in a cricle of radius $\frac{R_0}{2}$. the final value of the kinetic energy is



A. $\frac{1}{4}mv_{0^2}$

B. $2mv_0^2$

C. $\frac{1}{2}mv_{0^2}$

D. m_0^2

Answer:

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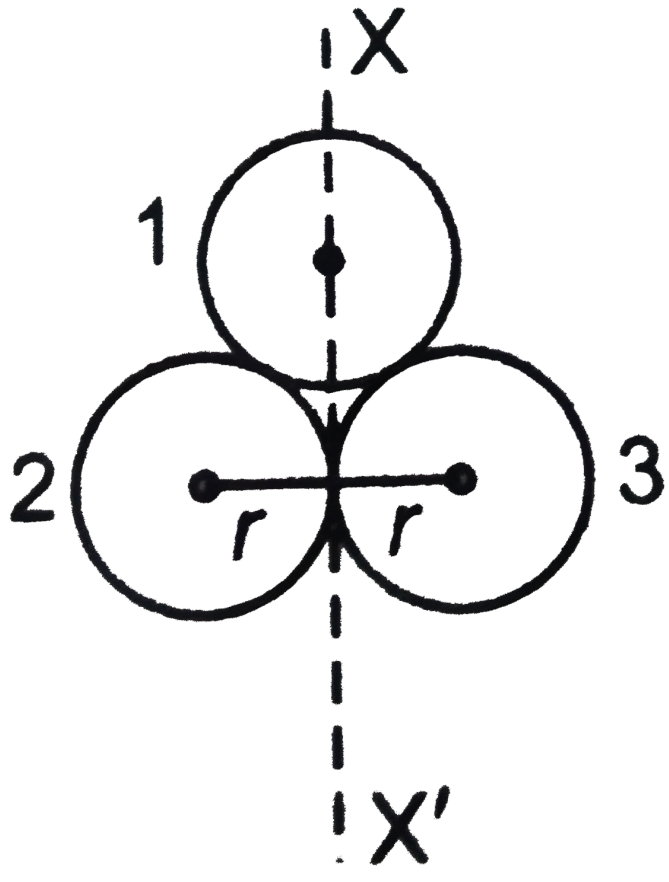
11. Three idential spherical shells each of mass m and radius r are placed as shown in Fig. Consider an axis XX' which is touching the two shells and passing through diameter of third shell. Moment of Inertia of the system consisting of these three spherical shells about XX' as axis is :



A. $3mr^2$

B. $\frac{16}{5}mr^2$

C. $4mr^2$

D. $\frac{11}{5}mr^2$

Answer:

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12. A rod of weight w is supported by two parallel knife edges A and B and is in equilibrium in a horizontal position. The knives are at a distance d from each other. The centre of mass of the rod is at a distance x from A.

A. $\frac{Wd}{x}$

B. $\frac{W(d-x)}{x}$

C. $\frac{W(d-x)}{d}$

D. $\frac{Wx}{d}$

Answer:

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13. Two spherical bodies of mass M and 5M & radii R & 2R respectively are released in free space with initial separation between their centres equal to 12R. If they attract each other due to gravitational force only, then the distance covered by the smallar body just before collision is

A. $4.5R$

B. $7.5R$

C. $1.5R$

D. $2.5R$

Answer:

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14. Kepler's third law states that square of period revolution (T) of a planet around the sun is proportional to third power of average distance i between sun and planet i.e. $T^2 = Kr^3$

here K is constant

if the mass of sun and planet are M and m respectively then as per Newton's law of gravitational the force of alteaction between them is $F = \frac{GMm}{r^2}$, here G is gravitational constant. The relation between G and K is described as

A. $GMK = 4\pi^2$

B. $K = G$

C. $K = \frac{1}{G}$

D. $GK = 4\pi^2$

Answer:

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15. A particle is performing harmonic motion if its velocity are v_1 and v_2 at the displecement from the mean position are y_1 and y_2 respectively then its time period is

A. $2\pi\sqrt{\frac{x_2^2 - x_1^2}{V_1^2 - V_2^2}}$

B. $2\pi\sqrt{\frac{V_1^2 + V_2^2}{x_2^2 + x_1^2}}$

C. $2\pi\sqrt{\frac{V_1^2 - V_2^2}{x_2^2 - x_1^2}}$

D. $2\pi\sqrt{\frac{x_1^2 - x_2^2}{V_1^2 - V_2^2}}$

Answer:

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16. when two displacements represented by $y_1 = a\sin(\omega t)$ and $y_2 = b\cos(\omega t)$ are superimposed the motion is

A. simple hormonic with amplitude $\frac{a}{b}$

B. simple harmonic with aplitude $\sqrt{a^2 + b^2}$

C. simple harmonic with amplitude $\frac{(a+b)}{2}$

D. not a simple harmonic

Answer:

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17. A wind with speed $40m/s$ blows parallel to the roof of a house. The area of the roof is $250m^2$. Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be : $\left(\rho_{air} = 1.2kg/m^3\right)$

A. $4.8 \times 10^5 N$, upwards

B. $2.4 \times 10^5 N$, upwards

C. $2.4 \times 10^5 N$, downwards

D. $4.8 \times 10^5 N$, downwards

Answer:

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18. The approximate depth of an ocean is $2700m$. The compressibility of water is $45.4 \times 10^{-11} Pa^{-1}$ and density of water is $10^3 \frac{kg}{m^3}$. What fractional compression of water will be obtained at the bottom of the ocean?

A. 1.0×10^{-2}

B. 1.3×10^{-2}

C. 1.4×10^{-2}

D. 0.8×10^{-2}

Answer:

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19. The fundamental frequency of a closed organ pipe of length $20cm$ is equal to the second overtone of an organ pipe open at

both the ends. The length of organ pipe open at both the ends is

A. $100cm$

B. $120cm$

C. $140cm$

D. $80cm$

Answer:

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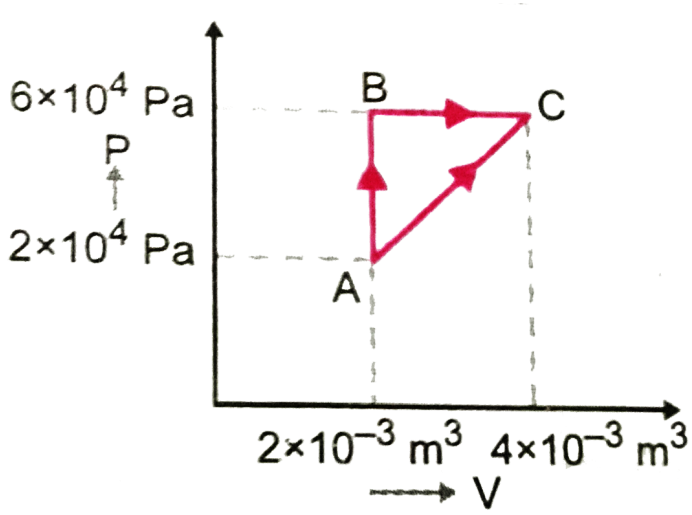
20. In (figure). shows two path that may be taken by a gas to go from a state A to state C



In the process AB, $400J$ of heat is added to the system and in process Bc, $100J$ of heat is added to the system. The heat absorbed by the system in the process AC will be

A. $500J$

B. $460J$

C. $300J$

D. $380J$

Answer:

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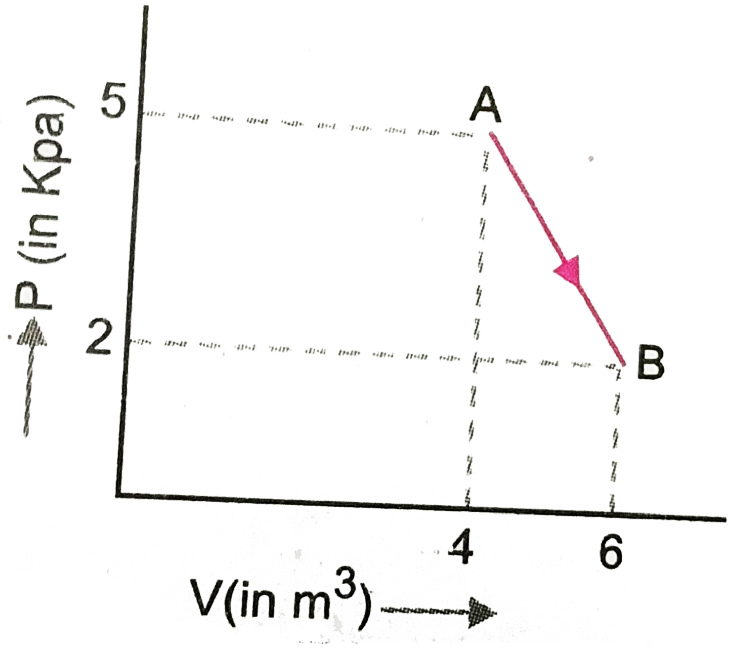
21. One mole of an ideal diatomic gas undergoes a transition from A to B along a path AB as shown in (figure). The change in internal energy of the gas during the transition is $(\gamma = 3/5)$



A. $-20kJ$

B. $20J$

C. $-12kJ$

D. $20kJ$

Answer:

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22. The ratio of the specific heats $\frac{C_P}{C_v} = \gamma$ in terms of degrees of freedom is given by

A. $\left(1+\frac{n}{3}\right)$

B. $\left(1+\frac{2}{n}\right)$

C. $\left(1+\frac{n}{2}\right)$

D. $\left(1+\frac{1}{n}\right)$

Answer:

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23. A Carnot engine, having an efficiency of $\eta = 1/10$ as heat engine, is used as a refrigerator. If the work done on the system is 10J, the amount of energy absorbed from the reservoir at lower temperature is

A. $99J$

B. $90J$

C. $1J$

D. $100J$

Answer:

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24. The two ends of a metal rod are maintained at temperature $100^\circ C$ and $110^\circ C$. The rate of heat flow in the rod is found to be $4.0 J/s$. If the ends are maintained at temperature s $200^\circ C$ and $210^\circ C$. The rate of heat flow will be

A. $16.8 J/s$

B. $8.0 J/s$

C. $4.0 J/s$

D. $44.0 J/s$

Answer:

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25. On observing light from three different stars P, Q and R, it was found that intensity of violet colour is maximum in the

spectrum of P, the intensity of green colour is maximum in the spectrum of R and the intensity of red colour is maximum in the spectrum of Q. if T_P, T_Q and T_R are respective absolute temperature of P, Q and R. then it can be concluded from the above observation that

A. $T_P > T_R > T_Q$

B. $T_P < T_R < T_Q$

C. $T_P < T_Q < T_R$

D. $T_P > T_Q > T_R$

Answer:

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Solved Questions

1. If the velocity of a particle is $v = At + Bt^2$, where A and B are constant, then the distance travelled by it between $1s$ and $2s$ is :

A. $\frac{3}{2}A + 4B$

B. $3A + 7B$

C. $\frac{3}{2}A + \frac{7}{3}B$

D. $\frac{A}{2} + \frac{B}{3}$

Answer: 3

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2. If the magnitude of sum of two vectors is equal to the magnitude of difference of the two vector, the angle between these Vector is

A. 180°

B. 0°

C. 90°

D. 45°

Answer: 3

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3. A particle moves so that its position vector is given by $\vec{r} = \cos\omega t\hat{x} + \sin\omega t\hat{y}$, where ω is a constant which of the following is true ?

A. Velocity is perpendicular to $\vec{v}$ and acceleration is directed anway from the origin.

B. Velocity and acceleration both are perpendicular to $\vec{r}$

C. Velocity and acceleration both are parallel to $\vec{r}$

D. Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards the origin.

Answer:

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4. A body of mass $1kg$ begins to move under the action of a time dependent force $\vec{F} = \left(2t\hat{I} + 3t^2\hat{j}\right)N$, where $\hat{i}$ and $\hat{j}$ are unit vectors along x-and y-axes. What power will be developed by the force at the time t ?

A. $\left(2t^2 + 3t^3\right)W$

B. $\left(2t^2 + 4t^4\right)W$

C. $\left(2t^3 + 3t^4\right)W$

D. $\left(2t^3 + 3t^5\right)W$

Answer:

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5. A paritcal of mass $10g$ moves along a circle of radius $6.4cm$ with a constant tangennitial acceleration. What is the magnitude of this acceleration . What is the magnitude of this acceleration if the kinetic energy of the partical becomes equal to $8 \times 10^{-4}J$ by the end of the second revolution after the beginning of the motion?

A. $0.2m/s^2$

B. $0.1m/s^2$

C. $0.15m/s^2$

D. $0.18m/s^2$

Answer:

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6. A car is negotisting a curved road of radius R . The road is banked at an angle theta. The coefficient of friction between the tyres of the car and the road is μ_s . The maximum safe velocity on this road is:

A. $\sqrt{gR^2\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}}$

B. $\sqrt{gR\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}}$

C. $\sqrt{\frac{g}{R}\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}}$

D. $\sqrt{\frac{g}{R^2}\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}}$

Answer:

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7. What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop?

A. $\sqrt{5gR}$

B. $\sqrt{gR}$

C. $\sqrt{2gR}$

D. $\sqrt{3gR}$

Answer:

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8. From a disc of radius R and $mass M$, a circular hole of diameter R, whose rim passes through the centre is cut. What is the moment of inertia of remaining part of the disc about a perependicular axis, passing through the centre ?

A. $3MR^2/32$

B. $15MR^2/32$

C. $13MR^2/32$

D. $11MR^2/32$

Answer:

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9. A uniform circular disc of radius $50cm$ at rest is free to turn about an axis, which is perpendicular to the plane and passes

through its centre. It is subjected to a torque which produces a constant angular acceleration of $2.0 rad / s^2$. Its net acceleration in m / s^2 at the end of $2.0 s$ is approximately

A. 8.0

B. 7.0

C. 6.0

D. 3.0

Answer:

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10. A disc and a solid sphere of same radius but different masses roll off on two inclined planes of the same altitude and length. Which one of the two objects gets to the bottom of the plane first ?

A. Disk

B. Sphere

C. Both reach at same time

D. Depends on their masses

Answer:

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11. At what height from the surface of earth the gravitation potential and the value of g are $-5.4 \times 10^7 Jkg^{-2}$ and $6.0ms^{-2}$ respectively ? Take the radius of earth as $6400km$:

A. $2000km$

B. $2600km$

C. $1600km$

D. $1400km$

Answer:

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12. The ratio of escape velocity at earth (v_e) to the escape velocity at a planet (v_y) whose radius and density are twice

A. $1:\sqrt{2}$

B. $1:2$

C. $1:2\sqrt{2}$

D. $1:4$

Answer:

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13. Two non-mixing liquids of densities ρ and $(n > 1)$ are put in a container. The height of each liquid is h. A solid cylinder of length L and density d is put in this container. The cylinder floats with its axis vertical and length $pL(p < 1)$ in the denser liquid. The density d is equal to :

A. $\{1 + (n + 1)p\}\rho$

B. $\{2 + (n + 1)p\}\rho$

C. $\{2 + (n - 1)p\}\rho$

D. $\{1 + (n - 1)p\}\rho$

Answer:

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14. A uniform rope of legnth 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. $\sqrt{\frac{m_1}{m_2}}$

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

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

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

Answer:

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15. An air column, closed at one end and open at the other resonates with a tuning fork when the smallest legnth of the column is 50 cm. The next larger length of the column resonating with the same tuning fork is

A. $66.7cm$

B. $100cm$

C. $150cm$

D. $200cm$

Answer:

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16. 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. $885Hz$

B. $765Hz$

C. $800Hz$

D. $838Hz$

Answer:

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17. Coefficient of linear expansion of brass and steel rods are α_1 and α_2. Length of brass and steel rods are l_1 and l_2 respectively. If $(l_2 - l_1)$ is maintained same at all temperature, which one of the following relations holds good?

A. $\alpha_1 l_2 = \alpha_2 l_1$

B. $\alpha_1 l_2^2 = \alpha_2 l_1^2$

C. $\alpha_1^2 l_2 = \alpha_2 l_1$

D. $\alpha_1 l_1 = \alpha_2 l_2$

Answer:

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18. The molecules of a given mass of a gas have rms velocity of $200 m / s at 27^\circ C$ and $1.0 \times 10^5 N / m_2$ pressure. When the temperature and pressure of the gas are respectively $127^\circ C$ and $0.05 \times 10^5 N m^{-2}$, the rms velocity of its molecules in $m s^{-1}$ is

A. $100\sqrt{2}$

B. $\frac{400}{\sqrt{3}}$

C. $\frac{100\sqrt{2}}{3}$

D. $\frac{100}{3}$

Answer:

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19. A piece of ice falls from a height h so that it melts completely. Only one-quarter of the heat produced is absobed by the ice and all energy of ice gets converted into heat during its fall. The value of h is

[Latent heat of ice is $3.4 \times 10^5 J/kg$ and $g = 10N/kg$]

A. $34km$

B. $544km$

C. $136km$

D. $68km$

Answer:

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20. A gas is compressed isothermally to half its initial volume. The same gas is compressed separately through an adiabatic process untill its volume is again reduced to half. Then

A. Comparessing the gas isothermal will require more work to be done.

B. Compressing the gas through adiabatic process will require more work to be done.

C. Compressing the gas isothermally or adabatically will require the same amount of work.

D. Which of the case (whether compression through isothermal or through adiabatic process) requires more work will depend upon the atommicity of the gas.

Answer:

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21. A refrigerator works between $4^\circ C$ and $30^\circ C$. It is required to remove $600cal$ or ies of heat every second in order to keep the temperature of the refrigerator space constant.The power required is (Take $1cal$ or $ie = 4.2J$)

A. $2.365W$

B. $23.65W$

C. $236.5W$

D. $2364W$

Answer:

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22. A black body is at a temperature of $5760K$. The energy of radiation emitted by the body at wavelength $250nm$ is U_1 at wavelength $500nm$ is U_2 and that at $1000nm$ is U_3. Wien's consant, $b = 2.88 \times 10^6 nmK$. Which of the following is correct?

A. $U_1 = 0$

B. $U_3 = 0$

C. $U_1 > U_2$

D. $U_2 > U_1$

Answer:

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23. A physical energy of the dimension of length that can be formula cut of c, G and $\frac{e^2}{4\pi\varepsilon_0}$ is [c is velocity of light G is universal constant of gravilation e is change

A. $c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

B. $\frac{1}{c^2}\left[\frac{e^2}{G4\pi\varepsilon_0}\right]^{1/2}$

C. $\frac{1}{c}G\frac{e^2}{4\pi\varepsilon_0}$

D. $\frac{1}{c^2}G\left[\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

Answer:

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24. Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time t_1. On other days, if the remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be :

A. $\frac{t_1 t_2}{t_2 - t_1}$

B. $\frac{t_1 t_2}{t_2 + t_1}$

C. $t_1 - t_2$

D. $\frac{t_1 + t_2}{2}$

Answer:

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25. The x and y coordinates of the particle at any time are $x = 5t - 2t^2$ and $y = 10t$ respectively, where x and y are in meters and t in seconds. The acceleration of the particle at t=2s is:

A. $5m/s^2$

B. $-4m/s^2$

C. $-8m/s^2$

D. 0

Answer:

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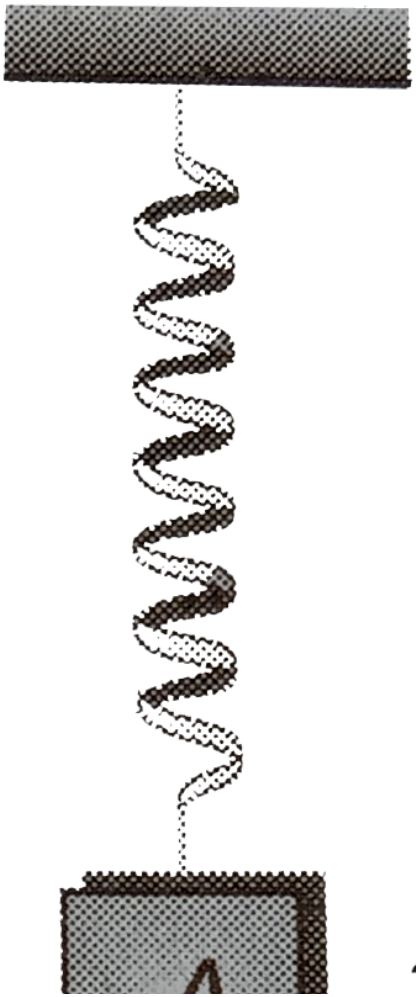
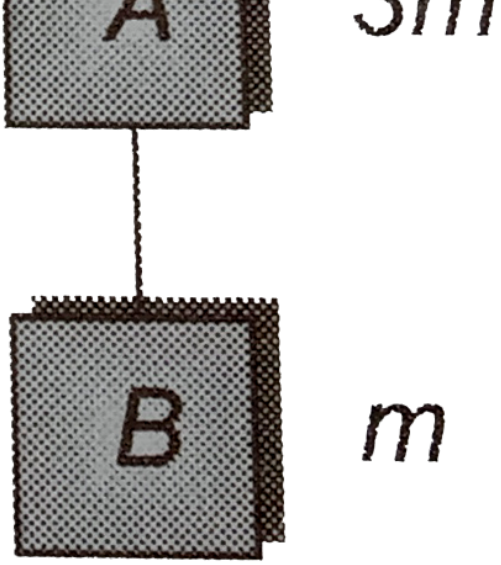
26. Two block A and B of masses $3m$ and m respectively are connected by a massless and nextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are resectively





A. $\frac{g}{3}, g$

B. g, g

C. $\frac{g}{3}, \frac{g}{3}$

D. $g, \frac{g}{3}$

Answer:

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27. A spring of force constant k is cut into lengths of ratio $1:2:3$. They are connected in series and the new force constant is k'. Then they are connected in parallel and force constant is k'. Then k' : k" is :

A. $1:9$

B. $1:11$

C. $1:14$

D. $1:16$

Answer:

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28. Consider a drop of rain water having mass 1 g falling from a height of $1km$. It hits the ground with a speed of $50m/s$ Take

'g' constant with a volume $10m/s^2$. The work done by the

(i) gravitational force and the

(ii) resistive force of air is :

A. (i) $1.25J$ (ii) $-8.25J$

B. (i) 100 J (ii) $8.75J$

C. (i) 10 J (ii) $-8.75J$

D. (i) $-10J$ (ii) $-8.25J$

Answer:

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29. One end of string of length l is connected to a particle on mass m and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with

speed v the net force on the particle (directed toward centre) will be (T reprents the tension in the string):

A. $T + \frac{mv^2}{1}$

B. $T - \frac{mv^2}{1}$

C. zero

D. T

Answer:

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30. Two astronauts are floating in gravitational free space after having lost contanct with their spaceship. The two will:

A. Move toward each other

B. move away from each other

C. Will become staitonary

D. Keep floating at the same distance between them

Answer:

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31. A rope is wound around a hollow cylinder of mass $3kg$ and radius $40cm$. What is the angular acceleration of the cylinder if the rope is pulled with a force of $30N$?

A. $0.25rad/s^2$

B. $25rad/s^2$

C. $5m/s^2$

D. $25m/s^2$

Answer:

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32. Two discs of same moment of inertia rotating their regular axis passing through centre and perpendicular to the plane of disc with angular velocities ω_1 and ω_2. They are brought into contact face to the face coinciding the axis of rotation. The expression for loss of enregy during this process is :

A. $\frac{1}{4}I(\omega_1 - \omega_2)^2$

B. $I(\omega_1 - \omega_2)^2$

C. $\frac{1}{8}(\omega_1 - \omega_2)^2$

D. $\frac{1}{2}I(\omega_1 + \omega_2)^2$

Answer:

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33. Which of following statements are correct ? ltbgt (a) Centre of mass of a body always coincides with the centre of gravity of the body

(b) Central of mass of a body is the point at which the total garvitational torque on the body is zero

(c) Couple on a body produces both trasnlational and rotation motion in a body

(d) Mechinical advantage greater than one means that small efforts can be used to lift a large load

A. (a) and (b)

B. (b) and (c)

C. (c) and (d)

D. (b) and (d)

Answer:

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34. The acceleration due to gravity at a height $1km$ above the earth is the same as at a depth d below the surface of earth. Then :

A. $d = 1km$

B. $d = \frac{3}{2}km$

C. $d = 2km$

D. $d = \frac{1}{2}km$

Answer:

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35. The bulk modulus of a spherical object is B if it is subjected to uniform pressure p, the fractional decrease in radius is:

A. $\frac{B}{3p}$

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

C. $\frac{p}{3B}$

D. $\frac{p}{B}$

Answer:

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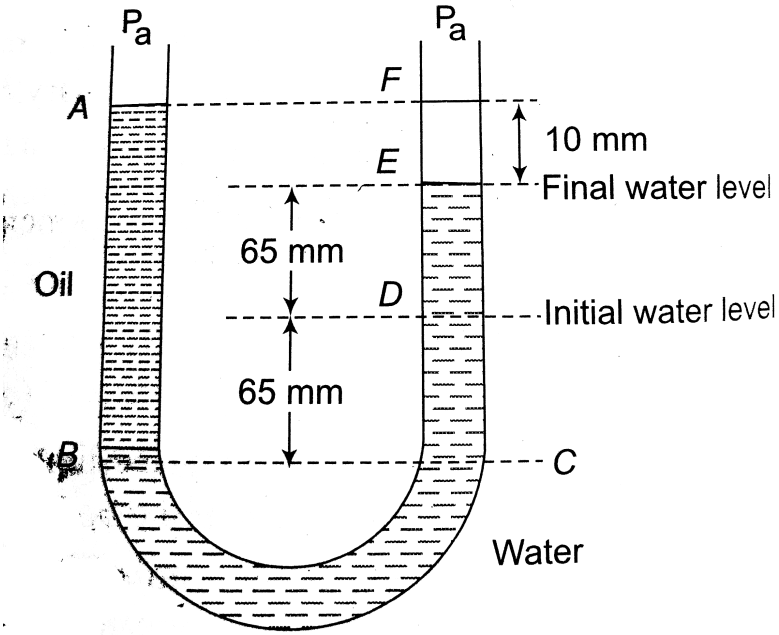
36. A U-tube with both ends open to the atmosphere is partially filled with water. Oil, which is immiscible with water. Is poured into one side until it stands at a distance of $10mm$ above the water level on the other side. Meanwhile the water rises by

$65mm$ from its original level (see diagram). The density of the oil is:



A. $425kgm^{-3}$

B. $800kgm^{-3}$

C. $928kgm^{-3}$

D. $650kgm^{-3}$

Answer:

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37. A particle executies linear simple harmonic motion with an amplitude $3cm$ .When the particle is at $2cm$ from the mean position , the magnitude of its velocity is equal to that of acceleration .The its time period in seconds is

A. $\frac{\sqrt{5}}{2\pi}$

B. $\frac{4\pi}{\sqrt{5}}$

C. $\frac{2\pi}{\sqrt{3}}$

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

Answer:

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38. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?

A. $20Hz$

B. $30Hz$

C. $40Hz$

D. $10Hz$

Answer:

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39. Two car 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 horn having a frequency $400Hz$. The

frequency heard by the driver of the second car is [velocity of sound $340 m / s$].

A. $361 Hz$

B. $411 Hz$

C. $448 Hz$

D. $350 Hz$

Answer:

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40. A gas mixture consists of 2 moles of oxygen and 4 moles of argon at temperature T. Neglecting all vibrational modes, the total internal energy of the system is

A. $15 RT$

B. $9RT$

C. $11RT$

D. $4RT$

Answer:

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41. A Carnot engine, having an efficiency of $\eta = 1/10$ as heat engine, is used as a refrigerator. If the work done on the system is 10J, the amount of energy absorbed from the reservoir at lower temperature is

A. $90J$

B. $99J$

C. $100J$

D. 1 J

Answer:

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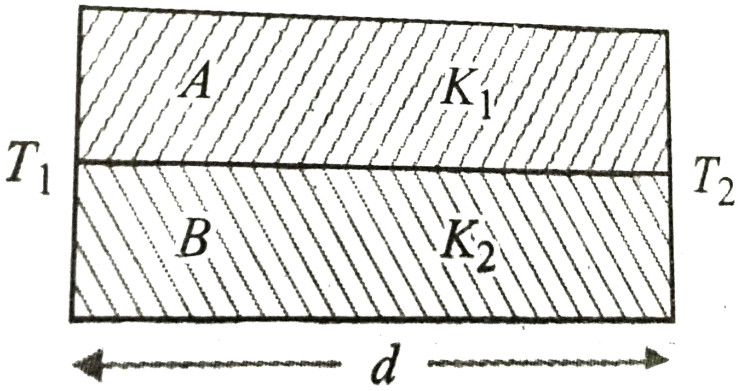
42. Two rods A and B of different materials are welded together as shown in figure. Their thermal conductivities are K_1 and K_2. The thermal conductivity of the composite rod will be



A. $\frac{3(K_1+K_2)}{2}$

B. $K_1 + K_2$

C. $2(K_1 + K_2)$

D. $\frac{K_1 + k_2}{2}$

Answer:

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43. A spherical black body with a radius of 12 cm radiates 450 watt power at 500 K. If the radius were halved and the temperature doubled, the power radiated in watt would be

A. 450

B. 1000

C. 1800

D. 225

Answer:

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44. A student measued the diameter of a small steel ball using a screw gauge of least count $1.001cm$. The main scale reading is $5mm$ and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero erroof $-0.004cm$, the correct diameter of the ball is

A. $0.053cm$

B. $0.529cm$

C. $0.525cm$

D. $0.521cm$

Answer: B

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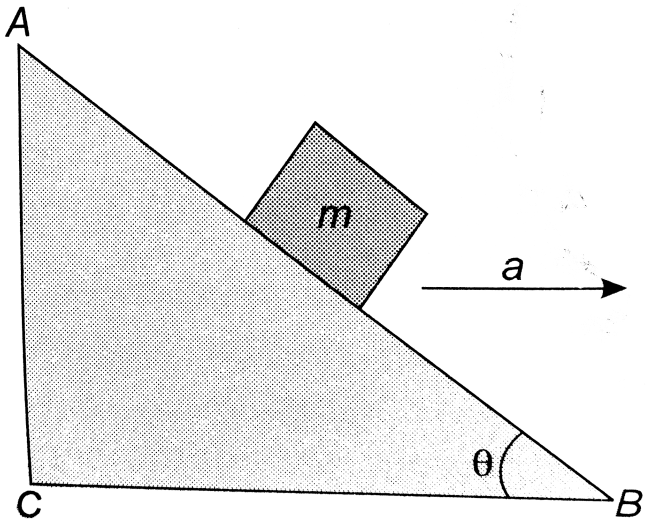
45. A block of mass m is placed on a smooth inclined wedge ABC of inclination theta as shown in the figure. The wedge is given an acceleration a towards the right. The relation between a and theta for the block to remain stationary on the wedge is.



A. $a = g\cos\theta$

B. $a = g\tan\theta$

C. $a = \frac{g}{\sin\theta}$

D. $a = \frac{g}{\cos ec\theta}$

Answer: B

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46. Which one of the following statement eis incorrect ?

A. Frictional force oppose the relative motion.

B. Coefficient of sliding friction has dimensions length.

C. Limiting value of static friction is directly proportional to normal reaction.

D. Rolling frictin is smaller than sliding friction

Answer: B

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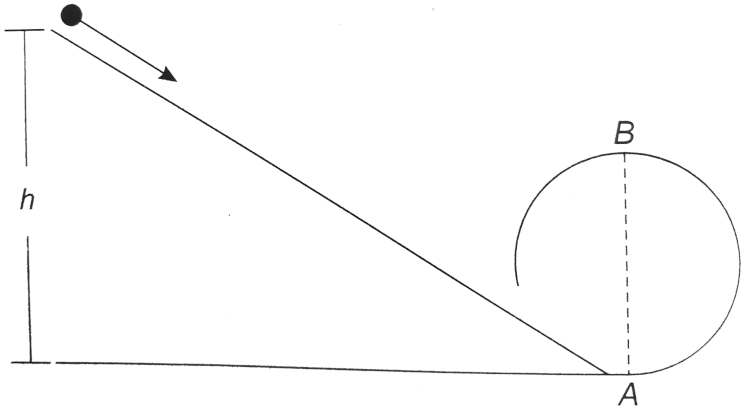
47. A body initially rest and sliding along a frictionless trick from a height h (as shown in the figure) just completes a vertical circle of diameter $AB = D$. The height h is equal to



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

B. $\frac{5}{4}D$

C. D

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

Answer: B

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48. A moving block having mass m , collides with another stationary block having mass $4m$. The lighter block comes to rest after collision. When the initial velocity of the block is v, then the value of coefficient of restitution (e) will be

A. 0.8

B. 0.4

C. 0.25

D. 0.5

Answer: C

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49. The moment of the force, $\overrightarrow{F} = 4\hat{i} + 5\hat{j} = 6\hat{k}$ t (2, 0 , - 3). About the point (2, - 2, 2)` is given by

A. $-7\hat{i} - 8\hat{j} - 4\hat{k}$

B. $-7\hat{i} - 4\hat{j} - 8\hat{k}$

C. $-4\hat{i} - \hat{j} - 8\hat{k}$

D. $-8\hat{i} - 4\hat{j} - 7\hat{k}$

Answer: B

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50. A solid sphere is rotating in free space. If the radius of the sphere is increased keeping mass same which one of the following wil not be affected?

A. Rotatinal kinetic energy

B. Angular momentum

C. Moment of inertia

D. Angular velocity

Answer: B

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51. There object, A : (a solid sphere), B : (a thin circular disk) and C : (a circular ring), each have the same mass M and radius R. They all spin with the same angular speed ω about their own symmetry axes. The amount of work (W) required ot bring them to rest, would satisfy the relation

A. $W_B > W_A > W_C$

B. $W_B > W_C > W_B$

C. $W_A > W_B > W_C$

D. $W_C > W_A > W_A$

Answer: D

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52. A solid sphere is in rolling motion. In rolling motion a body prosseses translational kinetic energy (K_t) as well as rotational kinetic energy (K_r) simutaneously. The ratio $K_t : (K_t + K_r)$ for the sphere is

A. $10:7$

B. $2:5$

C. $5:7$

D. $7:10$

Answer: C

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53. If the mass of the sun were ten times smaller and the universal gravitational constant were ten times larger in magnitude, which of the following is not correct?

A. Time period of a simple pendulum on the Earth would decrease.

B. $'g'$ on the Earth will not change

C. Walking on the ground would become more difficult.

D. Raindrops will fall faster.

Answer: B

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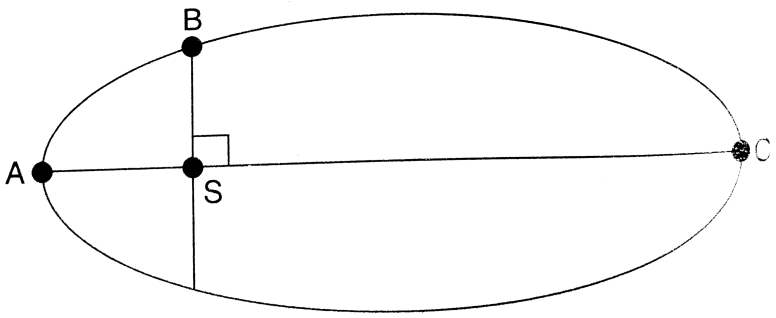
54. The kinetic energies of a planet in an elliptical orbit about the Sun, at positions A, B and C are K_A, K_B and K_C respectively. AC is the major axis and SB is perpendicular to AC at the position of the sun as shown in the figure. Then



A. $K_B < K_A < K_C$

B. $K_B > K_A > K_C$

C. $K_A B > K_B > K_C$

D. $K_A < K_B < K_C$

Answer: C

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55. Two wires are made of the same material and have the same volume. However wire 1 has cross-sectional area A and wire 2 has cross-sectional area 3A. If the length of wire 1 increases by Δx on applying force F, how much force is needed to stretch wire 2 by the same amount?

A. $4F$

B. F

C. $6F$

D. $9F$

Answer: D

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56. A small sphere falls from rest in a viscous liquid. Due to friction, heat is produced. Find the relation between the rate of production of heat and the radius of the sphere at terminal velocity.

A. r^5

B. r^4

C. r^2

D. r^3

Answer: A

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57. A pendulum is hung the roof of a sufficiently high huilding and is moving freely to and fro like a simple harmonic oscillator .The acceleration of the bob of the pendulum is $20m/s^2$ at a distance of $5m$ from the meanposition .The time period of oscillation is

A. $2s$

B. $1s$

C. πs

D. $2\pi s$

Answer: C

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58. The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is

A. $12.5cm$

B. $16cm$

C. $8cm$

D. $13.2cm$

Answer: D

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59. A tuning fork is used to produce resonance in glass tuve. The length of the air column in the tube can be adjusted by a variable piston. At room temperature of $27^{\circ}C$ two succesive

resonance are produced at 20 cm and 73 cm column length. If the frequency of the tuning fork is 320 Hz. the velocity of sound is air at $27^\circ C$ is

A. $350\frac{m}{s}$

B. $300\frac{m}{s}$

C. $339\frac{m}{s}$

D. $330\frac{m}{s}$

Answer: C

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60. At what temperature , will the rms speed of oxygen molecules be sufficient for escaping from the earth ? Take $m = 2.76 \times 10^{-26} kg, k = 1.38 \times 10^{-23} J/K$ and $v_e = 11.2 km/s$

.

A. $5.016 \times 10^4 K$

B. $1.254 \times 10^4 K$

C. $8.360 \times 10^4 K$

D. $2.508 \times 10^4 K$

Answer: C

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61. A sample of $0.1g$ of water of $100^\circ C$ and normal pressure $\left(1.013 \times 10^5 Nm^{-2}\right)$ requires 54 cal of heat energy to convert to steam at $100^\circ C$. If the volume of the steam produced is 167.1 cc, the change in internal energy of the sample is

A. $42.2J$

B. $84.5J$

C. $208.7J$

D. $104.3J$

Answer: C

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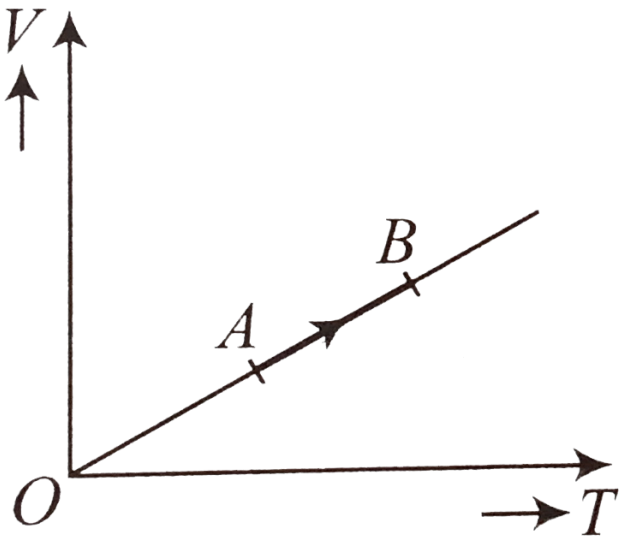
62. The volume (V) of a monatomic gas varies with its temperature (T) as shown in the graph. The ratio of work done by the gas, to the heat absorbed by it, when it undergoes a

change from state A to state B,is



A. $\frac{1}{3}$

B. $\frac{2}{7}$

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

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

Answer: D

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63. The efficiency of an ideal heat engine working between the freezing point and boiling point of water, is

A. $6.25\ \%$

B. $12.5\ \%$

C. $20\ \%$

D. $26.8\ \%$

Answer: D

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64. The energy spectrum f a black body exhibits a maximum around a wavelength λ_0. The temperature of the black body is now changed such that the energy is maximum around a

wavelength $3\lambda_0/4$. The power radiated by the black body will now increase by a factor of

A. $\frac{256}{1}$

B. $\frac{81}{256}$

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

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

Answer: A

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