PHYSICS

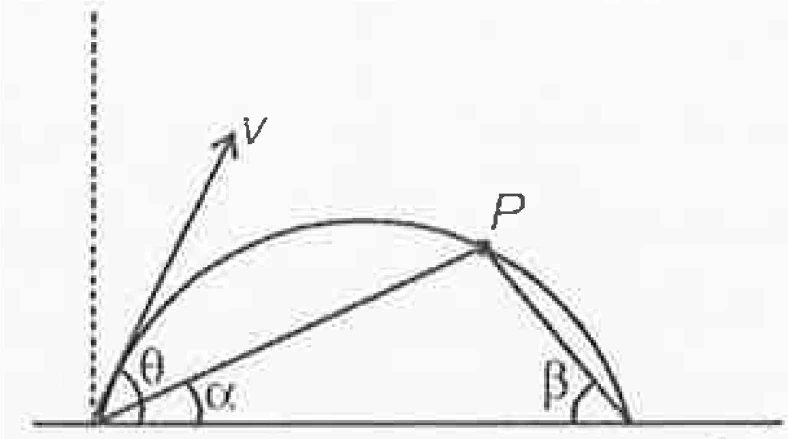
AAKASH INSTITUTE ENGLISH

MOCK TEST 5

Example

1. A point P on the trajectory of a projectile projected at angle with θ with horizontal subtrends angles α and β

at the point of landing them



A. $\tan\theta + \tan\alpha = \tan\beta$

B. $\tan\alpha + \tan\beta = \tan\theta$

C. $\tan\theta + \tan\beta = \tan\alpha$

D. $\tan\theta + \tan\alpha = 2\tan\beta$

Answer: B

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2. During projectile motion,the quantities that remain unchanged are

A. Force and vertical velocity

B. Acceleration and horizontal velocity

C. kinetic energy amd acceleration

D. Acceleration and momentum

Answer: B

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3. The equation of a projectile is $y = \sqrt{3}x - \left(\frac{gx^2}{2}\right)$ the horizontal range is

A. $\frac{2g}{\sqrt{3}}$

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

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

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

Answer: B

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4. At the top of the trajectory of projectile the

A. Acceleration is minimum

B. Velocity is zero

C. Acceleration is maximum

D. Acceleration is g

Answer: D

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5. The equations of motion of a projectile are given by $x = 36t$ m and $2y = 96t - 9.8t^2$ m. The angle of projection is

A. $\sin^{-1}\left(\frac{4}{5}\right)$

B. $\sin^{-1}\left(\frac{3}{5}\right)$

C. $\sin^{-1}\left(\frac{4}{3}\right)$

D. $\sin^{-1}\left(\frac{3}{4}\right)$

Answer: A

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6. An object is projected with a velocity of $20\frac{m}{s}$ making an angle of 45° with horizontal. The equation for the trajectory is $h = Ax - Bx^2$ where h is height, x is horizontal distance, A and B are constants. The ratio A:B is (g $= ms^{-2}$)

A. 0.079872685185185

B. 2.8472337962963

C. 80

D. 40

Answer: D

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7. At the topmost point of a projectile trajectory, its velocity and acceleration are an angle of

A. 180^{o}

B. 90^{o}

C. 60^{o}

D. 45^{o}

Answer: B

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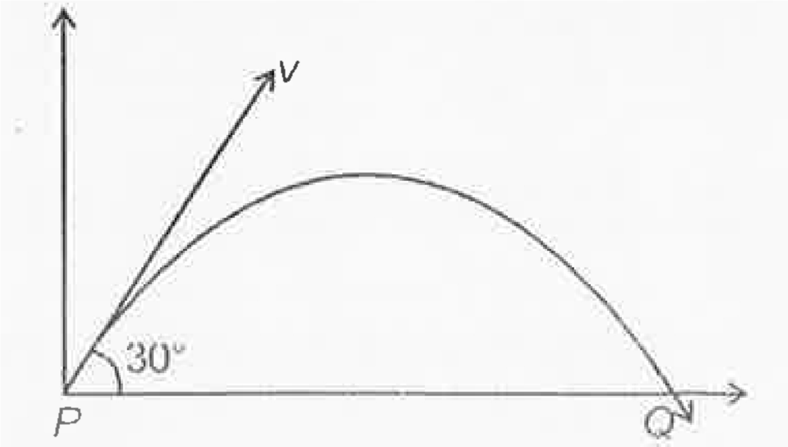
8. A projectile of a mass m is fired with velocity v from point a as shown in figure neglecting air resistance, what is the change in momentum in x direction when leaving from P and arriving at Q?



A. zero

B. mv

C. 4mv

D. $2m\frac{v}{\sqrt{3}}$

Answer: B

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9. A ball of mass 2kg is thrown with velocity $10\frac{m}{s}$ at an angle of 30°to the horizontal and another ball with the same mass is thrown at an angel of 60° to the horizontal with the same speed.The ratio will be their range will be

A. 0.063229166666667

B. 0.056261574074074

C. D

D.

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10. A projectile is projected from ground such that the maximum height attained by, it is equal to half the horizontal range.The angle of projection with horizontal would be

A. $\tan^{-1}(2)$

B. $\tan^{-1}(3)$

C. $\tan^{-1}(4)$

D. $\tan^{-1}\sqrt{2}$

Answer: A

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11. A ball is projected with the velocity an angle of θ and (90°-θ) with horizontal.If h_1 and h_2 are maximum heights attained by it in two paths and R is the range of a projectile, then which of the following relation is correct

A. $R = h_1 h_2$

B. $R = h_1 + h_2$

C. $R = 4(h_1 h_2)^{\frac{1}{2}}$

D. $R = (h_1 h_2)^{\frac{1}{3}}$

Answer: C

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12. A particle is projected with velocity of $10\frac{m}{s}$ at an angle of 15° with horizontal.The horizontal range will be $\left(g = 10\frac{m}{s^2}\right)$

A. 10m

B. 5m

C. 2.5m

D. 1m

Answer: B

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13. A projectile is projected from ground with initial velocity $\overrightarrow{u} = u_0\hat{i} + v_0\hat{j}$. If acceleration due to gragvity (g) is along the negative y-direction then find maximum displacement in x-direction.

A. $\frac{2`\mu_1\mu_2`}{g}$

B. $\frac{`\mu_1^2}{g}$

C. $\frac{4`\mu_1\mu_2`}{g}$

D. $\frac{`\mu_2^2}{g}$

Answer: A

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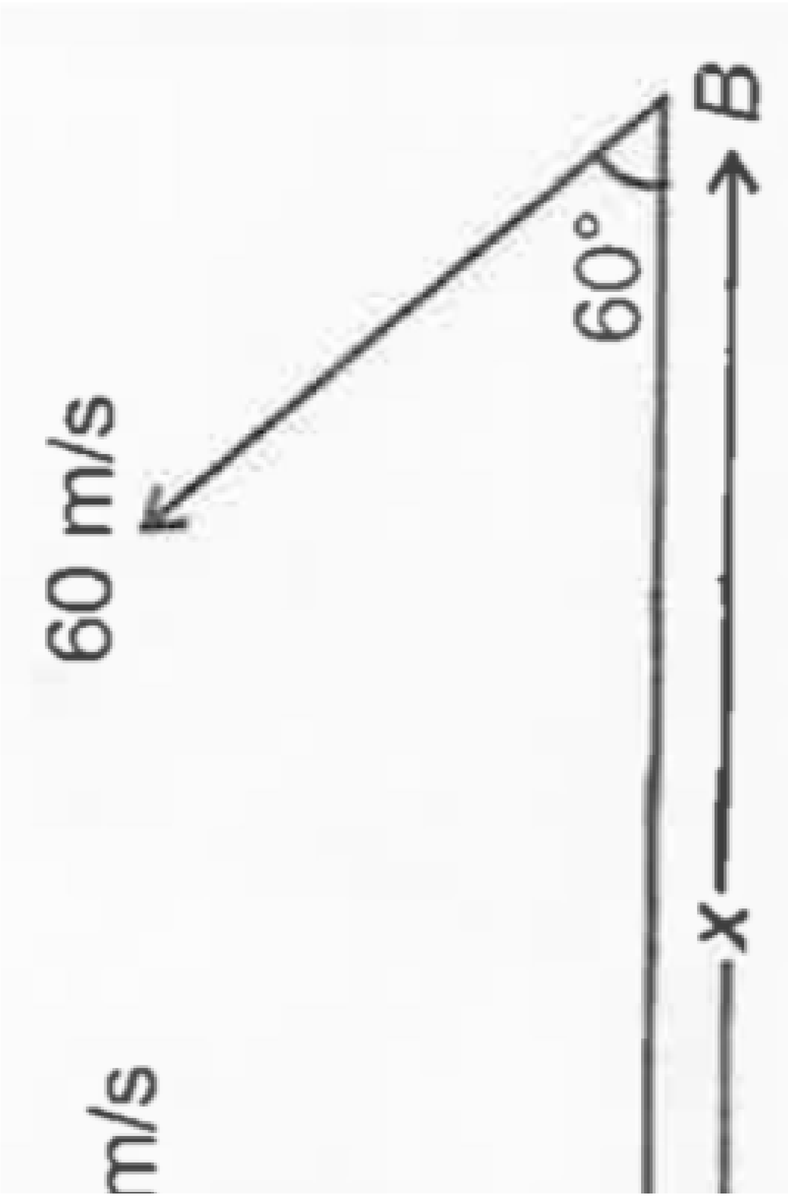
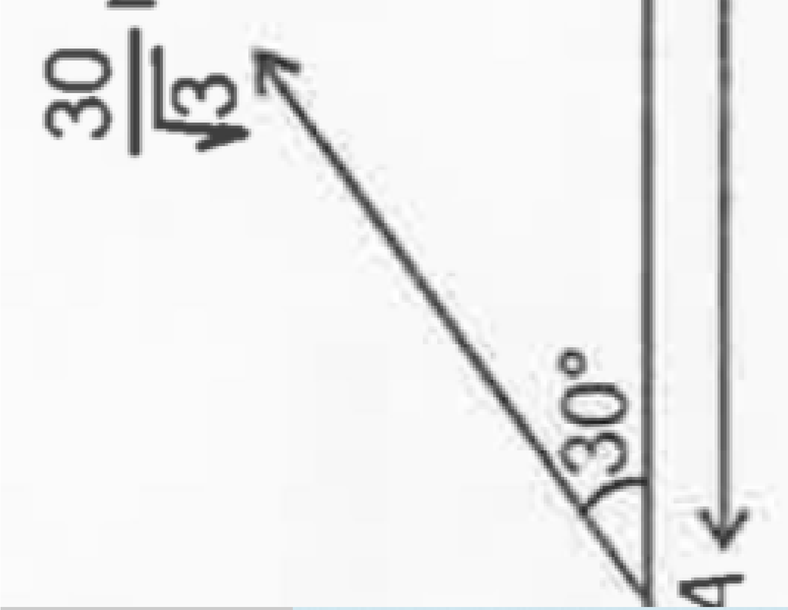
14. Two balls are projected from two points A and B,x metre apart as shown in figure.The time after which the horizontal distance between them become zero is





A. $\frac{x}{10}$s

B. $\frac{x}{20}s$

C. $\frac{x}{45}s$

D. $\frac{x}{15}s$

Answer: C

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15. For an object thrown at 45° to the horizontal, the maximum height H and horizontal range R are related as

A. R = 4H

B. R = 8H

C. R = 2H

D. R = H

Answer: A

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16. If two projectile of same mass are thrown at an angle of 50° and 40° with the horizontal with the same speed then, which of the following statement is true?

A. Time of flight of both projectile is same

B. Maximum height acquired by both projectiles is same

C. Horizontal range of both projectiles is Same

D. None of these

Answer: C

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17. Calculate the average angular velocity of the hour hand of the of a clock.

A. $\left(2\frac{\pi}{12}\right)rads^{-1}$

B. $\left(2\frac{\pi}{720}\right)rads^{-1}$

C. $\left(\frac{\pi}{21600}\right)rads^{-1}$

D. $\left(2\frac{\pi}{21600}\right)rads^{-1}$

Answer: C

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18. A particle with the constant speed in a circle of radius r and time period T.The centripetal acceleration of a particle is

A. $`r^2`T$

B. $`T^2`r$

C. $\left(2\frac{\pi}{T}\right)^2 r$

D. $\frac{(2\pi T)^2}{r}$

Answer: C

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19. An electron moves in circular orbit of radius r with constant speed v.The force acting in it is

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

B. mvr

C. $\frac{m^2v^2}{r}$

D. zero

Answer: A

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20. A particle is moving on a circular path of radius 10m with uniform speed of $4ms^{-1}$.The magnitude of change in velocity of particle when it completes a semi circular path is

A. $4ms^{-1}$

B. $8ms^{-1}$

C. $10ms^{-1}$

D. zero

Answer: B

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21. A particle is moving along a circular path with uniform speed. Through what angle does its angular velocity change when it completes half of the circular path ?

A. 0°

B. 45°

C. 180°

D. 360°

Answer: A

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22. If a particle moves in a circle describing equal angles in equal intervals of time, then the velocity vector.

A. changes its magnitude only

B. changes its direction only

C. changes both its magnitude and direction

D. both magnitude and direction remains constant

Answer: B

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23. If a particle is moving on circular path with uniform speed,then which of the following physical quantity remains constant?

A. Acceleration

B. Kinetic energy

C. Momentum

D. Velocity

Answer: B

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24. The degrees of freedom of CO gas molecule at moderate temperature is

A. 6

B. 7

C. 3

D. 8

Answer: 7

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25. 7 g N_2 and 8 g O_2 is filled in a container of volume 5 litre at temperature $27^{\circ}C$. Total pressure of the gases is nearly (R=0.082 litre atm $mol^{-1}K^{-1}$)

A. 5 atm

B. 2.5 atm

C. 10 atm

D. 12 atm

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26. Amount of heat energy required to raise the temperature of 2 g neon gas by $54^{\circ}F$ at constant volume is (R= 2 cal $mol^{-1}K^{-1}$)

A. 30 cal

B. 15 cal

C. 9 cal

D. 20 cal

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27. An open vessel at $27^{o}C$ is heated to $127^{o}C$. The fraction of mass of air that will escape from vessel is (Neglect expansion of vessel)

A. $\frac{1}{4}$

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

C. $\frac{1}{2}$

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

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28. Tensile stress is possible in

A. Liquids

B. Gases

C. Solids

D. Both (1) & (2)

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29. A wire has Poisson's ratio 0.3. If the change in the length of the wire on stretching it is 1% then percentage change in the volume of the wire will be

A. 0.4%

B. zero

C. 1.5%

D. 0.6%

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30. A wire of cross-sectional area A breaks due to its own weight when length of the wire is l. If area of cross-section of the wire is made $3A$ then maximum length of the wire can be hung without breaking is

A. $3l$

B. $2l$

C. $1.5l$

D. l

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31. If in case-A, elongation in wire of length L is l. Then for same wire, elongation is case-B will be

- $2l$
- $5l$
- $3l$
- $2.4l$

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32. The height of mercury in the barometer tube is $70cm$ due to entrapped air in it as shown in figure. Now from this position tube is pulled up slightly, then length of the mercury column in the tube will 

- Remain 70cm
- Slightly more than 70cm
- Slightly less than 70cm
- Can't say

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33. The excess pressure inside a soap bubble is equal to an oil column of height 3 mm. The total surface area of the Soap bubble in contact with air will be (given density of oil= $0.9g\frac{m}{c}m^3$, surface tension of soap solution= 0.03 N/m and g= $10\ ms^{-2}$)

A. $4.96 \times 10^{-4}m^2$

B. $2.43 \times 10^{-4}m^2$

C. $3.72 \times 10^{-4}m^2$

D. $1.03 \times 10^{-4}m^2$

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34. An incompressible liquid is flowing through Aa horizontal pipe as shown in figure. The magnitude of velocity v is

- 1 m/s
- $\frac{2}{3}$ m/s
- $\frac{3}{2}$ m/s
- 2 m/s

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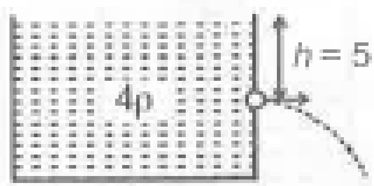
35. A container filled with a liquid of density $4p$ as shown in the figure. The velocity efflux through orifice is (ρ is density of water and g = 10 ms^{-2})



A. 20 m/s

B. 10 m/s

C. 14 m/s

D. 28 m/s

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36. A boat floating in a lake is carrying a number of cork balls. If the cork balls are unloaded into water, then water level

A. A. Remains unchanged

B. B. Rises

C. C. Falls

D. D. May rise or fall depends on the number of cork ball

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37. A human heart pumps 50 of blood per heart besat at a pressure of 1.5 m of water. If the heart beats are 75 per minute then average pumping power of heart (g = $10\frac{m}{s^2}$)

A. 3.0 W

B. 2 W

C. 0.94 W

D. 1.5 W

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38. When two substances of specific gravities d_1 and d_2 are mixed in equal volumes the specific garvity of mixture is found to be ρ_1. When they are mixed in equal masses, the specific gravity of the mixture is found to be ρ_2.$(d_1 \neq d_2)$

A. $\rho_1 = \rho_2$

B. $\rho_1 > \rho_2$

C. $\rho_1 < \rho_2$

D. $\rho_2 = 2\rho_1$

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39. Volume rate flow of a liquid of density ρ and coefficient of viscosity η through a cylindrical tube of diameter D is Q. Reynold's number of the flow is

A. $\dfrac{4\rho Q}{\pi\eta D}$

B. $\dfrac{\rho Q}{\pi\eta D}$

C. $\dfrac{\pi\rho Q}{4\eta D}$

D. $\dfrac{\pi\rho Q}{\eta D}$

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40. on heating a cylindrical metallic rod, its length increases by 2% . Then area of cross section of rod will

A. decrease by 2%

B. increased by 2%

C. decrease by 4%

D. increased by 4%

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41. the water equivalent of a calorimeter is $50g$. This calorimeter is used to heat $100g$ of water from $10^{\circ}C$ to $60^{\circ}C$. Amount of heat required to do this is

A. 7.5 kcal

B. 5.0 kcal

C. 2.5 kcal

D. 10.0 kcal

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42. Two metallic rods of same area of cross section, having lengths in ratio $2:3$ and ratio of thermal conductivities $2:3$ are connected in series across a temperature difference as shown in figure. The temperature of the junction (θ_0) is

- $125^\circ C$
- $150^\circ C$
- $160^\circ C$
- $180^\circ C$

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43. Steam at $100^\circ C$ is passed into $100g$ of ice at $0^\circ C$. Finally when $80g$ ice melts the mass of water present will be [Latent heat of fusion and vaporazisation are 80 calg^{-1} and 540 calg^{-1} respectively, specific heat of water = 1 cal $g^{-1}{}^{\circ}C^{-1}$]

A. $80g$

B. $100g$

C. $90g$

D. $75g$

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44. A uniform linear thermometer scale is at steady state with its 0 cm mark at $-10^{\circ}C$ and $50cm$ mark at

$80^{\circ}C$. temperature corresponding to $70cm$ marks is

A. $126^{\circ}C$

B. $136^{\circ}C$

C. $106^{\circ}C$

D. $116^{\circ}C$

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45. C_P and C_V are specific heats at constant pressure and constant volume respectively. it is observed that $C_P - C_V = p$ for helium gas and $C_P - C_V = q$ for Oxygen gas. The correct relation between p and q is

A. $p = q$

B. $p = 8q$

C. $p = 16q$

D. $p = \frac{q}{8}$

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46. An external pressure P is applied on a cube at $0^{\circ}C$ so that is it equally compressed from all sides. K is the bulk modulus o the material of the cube and α is its coefficient of linear expansion. Suppose we want to bring the cube to its original size by heating. the temperature should be raised by:-

A. $\frac{P}{\gamma B}$

B. $\frac{P}{3\gamma B}$

C. $PB\gamma$

D. $\frac{\gamma}{PB}$

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47. A spherical body of radius $10cm$ radiates $300W$ at $227^{\circ}C$. If the radius is doubled and temperature is remain same, the power radiated will be

A. $300W$

B. 1200 W

C. 75 W

D. 900 W

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48. which of the following volume-temperature $(V - T)$ curve best represents an isobaric process for a fixed mass of gas?

A.

B.

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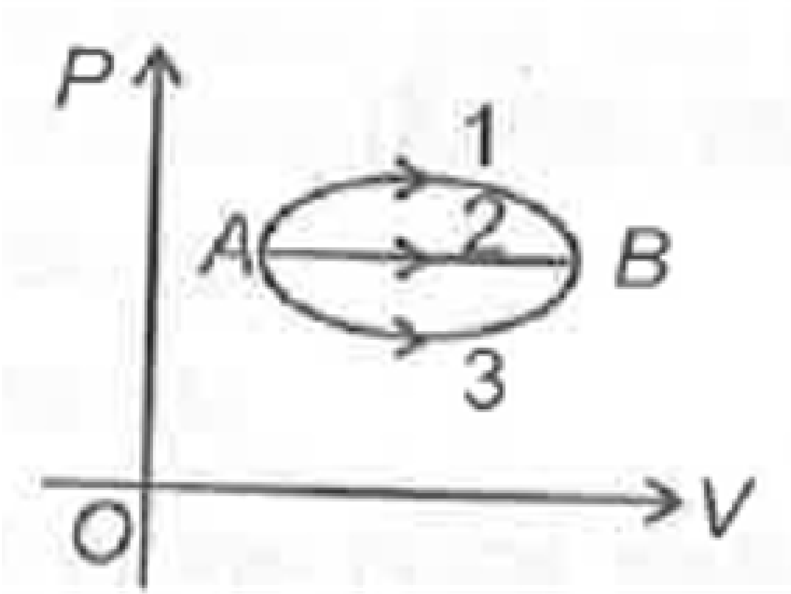
49. An ideal gas is taken from state A to state B via three different processes as shown in the pressure volume$(P - V)$ diagram. If Q_1, Q_2 &Q_3 indicates the heat absorbed by the gas and ΔU_1 , ΔU_2 &ΔU_3 indicate change in internal energy in three processes, then



A. Q_1gtQ_2gtQ_3

B. Q_1ltQ_2ltQ_3

C. ΔU_1 = ΔU_2 =ΔU_3

D. Both (1) &(3)

50. For a gaseous system, if heat rejected by the system is $100J$ and work done by the system is $20J$, then change in internal energy is

A. -120 J

B. -80 J

C. 80 J

D. 120 J

51. when two bodies A and B are in thermal equilibrium then

A. internal energy of A must be greater than internal energy of B

B. internal energy of A must be less than internal energy of B

C. internal energy of A must be equal to internal energy of B

D. temperature of A must be equal to temperature of B

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52. an ideal gas is expanding such that $PT = cons\tan t$. The coefficient of the volume expansion of the gas is (where symbols have their own meanings)

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

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

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

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

53. in a reversible adiabatic expansion, entropy of the system

A. will increase

B. will decrease

C. will remain same

D. may be increase or decrease

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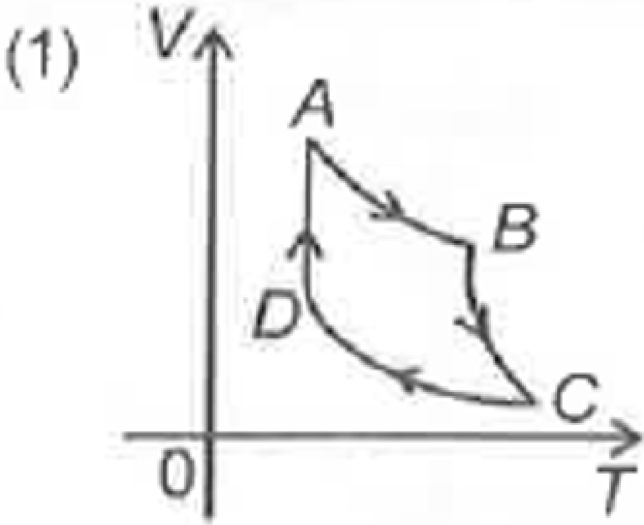
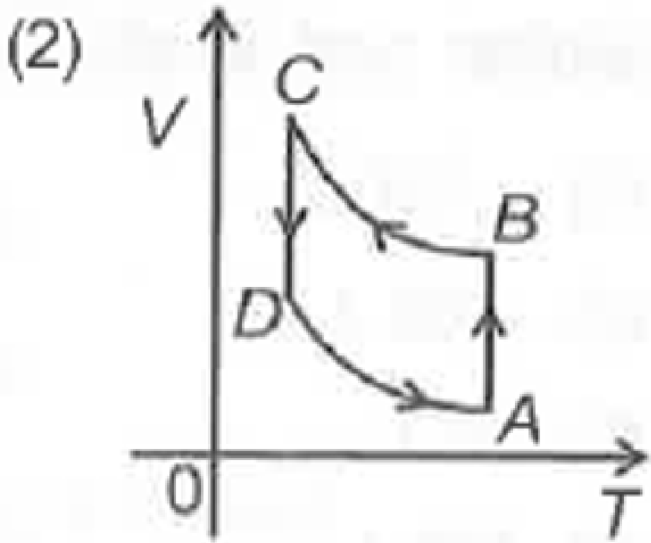
54. which of the following volume temperature $(V - T)$ graph represent carnot engine cycle $ABCDA$

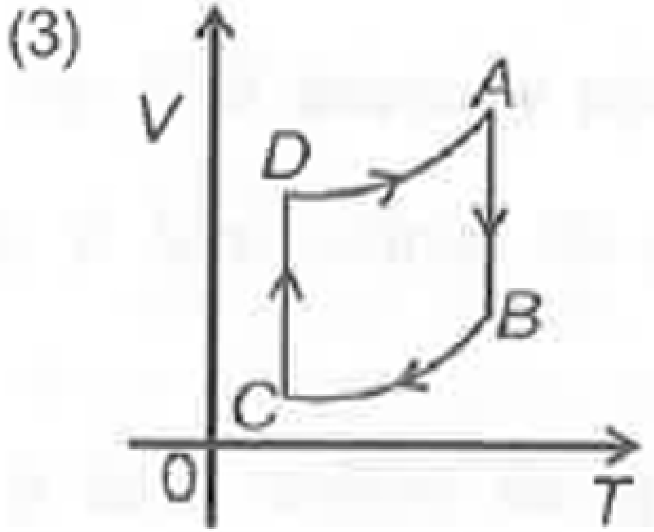
?



A.

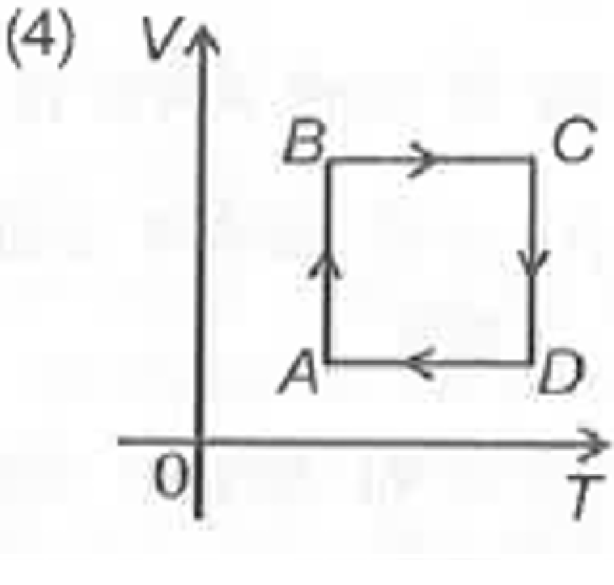


B.



C.

D.



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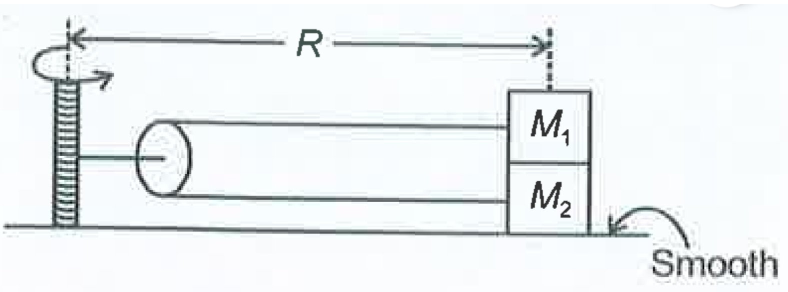
55. the volume(V) of a polyatomic(non linear molecule) gas varies with its temperature(T) , as shown in figure. The ratio of the heat absorbed by the gas to the work done by the gas, when gas is taken from state A to state B , is (neglect vibrational mode)



A. $5:2$

B. $3:2$

C. $7:2$

D. $4:1$

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56. an ideal diatomic gas undergoes a polytropic process described by the equation $P\sqrt{V} = cons\tan t$. The molar heat capacity of the gas during this process is

A. $9\frac{R}{2}$

B. R/2

C. $7\frac{R}{2}$

D. $5R$

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57. A refrigerator works between $0^{\circ}C$ and $45^{\circ}C$.It is required to remove $2000J$ of heat per second in order to keep the temperature of freezer constant.The electric power required is about

A. $110W$

B. $220W$

C. $330W$

D. $260W$

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58. In the given pressure-temperature $(P-T)$ diagram, what is the relation between volumes V_1 and V_2 for a fixed mass of a gas?

A. A. $V_1 > V_2$

B. B. $V_2 > V_1$

C. C. $V_1 = V_2$

D. D. $V_2 = 2V_1$

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59. An ideal gas is expended adiabatically then

A. Temperature of the gad will increased

B. Temperature of the gad will decreased

C. No change in temperature of the gas

D. Heat will be added to the system

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60. A heat engine works between source and sink temperatures $150^{\circ}C$ and $30^{\circ}C$ respectively.The efficiency of heat engine may be

A. 35%

B. 25%

C. 38%

D. 48%

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61. An ideal gas at $300K$ is expanded isothermally to double its volume,then pressure of the gas will be

A. Same

B. Half

C. Double

D. More than double

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62. An ideal gas with adiabatic exponent γ is heated isochorically. If it absorbs Q amount heat then, fraction of heat absorbed in increasing the internal energy is

A. γ

B. $\frac{1}{\gamma}$

C. 1

D. $\frac{\gamma - 1}{\gamma}$

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63. an electric dipole is placed in an electric field generated by a point charge

A. The net electric force on the dipole must be zero

B. The net electric force on the dipole may be zero

C. The torque on the dipole due to the field may be zero

D. Both (2) and (3)

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64. Two identical balls each having a density ρ are suspended from a common point by two insulating string of equal length. Both the balls have equal mass and charge. In equilibrium each string makes an angle θ with vertical. Now, both the balls are immersed in a liquid. As a result the angle θ does not change. The density of the liquid is σ. find the dielectric constant of the liquid.

A. $\left(\frac{\sigma}{\rho} - \sigma\right)$

B. $\left(\frac{\rho}{\rho} - \sigma\right)$

C. $\frac{\sigma}{\rho}$

D. $\frac{\rho}{\sigma}$

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65. A small metallic bob of mass m of a simple pendulum of length L is suspended between the two oppositely charged large parallel plates . The electric field E act vertically. If positive charge 'q' is given to bob and displaced slightly from mean position then time period of oscillation will be

A. A. $T = 2\pi\left(\frac{L}{g - \left(q\frac{E}{m}\right)}\right)^{\frac{1}{2}}$ when lower plate charge positively

B. B. $T = 2\pi\left(\frac{L}{g - \left(q\frac{E}{m}\right)}\right)^{\frac{1}{2}}$ when lower plate charge negetively

C. C. $T = 2\pi\left(\frac{L}{g + \left(q\frac{E}{m}\right)}\right)^{\frac{1}{2}}$ when lower plate charge negetively

D. D. both a and c

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66. A positive charge q is enclosed by a Guassian spherical surface of radius 'a' . If its radius is increased to 4a then the net outward flux will

A. Become four time

B. Become two times

C. Become sixteen times

D. Remain same

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67. An electric dipole of dipole moment $\overrightarrow{P}$ is lying along uniform electric filed $\overline{E}$. The work done in rotating the dipole by 37° is

A. $\frac{2}{5}PE$

B. $\left(-\frac{2}{5}\right)PE$

C. $P\frac{E}{5}$

D. $\left(\frac{3}{5}\right)PE$

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68. A wire of length l and charge q is bent in form of a semicircle. The charge is uniformly distributed over the length. The electric field at the centre of semicircle is

A. $\frac{q}{\varepsilon_0 l^2}$

B. $\frac{q}{2}\left(\varepsilon_0 l^2\right)$

C. $\frac{q}{4\pi\left(\varepsilon_0 l^2\right)}$

D. $\frac{q}{2\pi\left(\varepsilon_0 l^2\right)}$

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69. A non-conducting sphere of radius R is given a charge Q. Charge is uniformly distributed in its volume. The electric potential at centre and at the surface of sphere respectively are

A. A. zero and $\left(\frac{Q}{4}\pi\varepsilon_0 R\right)$

B. B. $\left(\frac{Q}{4}\pi\varepsilon_0 R\right)$ and zero

C. C. $\left(3\frac{Q}{4}\pi\varepsilon_0 R\right)$ and $\left(\frac{Q}{4}\pi\varepsilon_0 R\right)$

D. D. $\left(3\frac{Q}{8}\pi\varepsilon_0 R\right)$ and $\left(\frac{Q}{4}\pi\varepsilon_0 R\right)$

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70. A parallel plate capacitor with liquid filled between the plates (dielectric constant of liquid, $k = 4$)has capacitance $20\mu F$. If the liquid is removed then capacitance of capacitor becomes

A. $10\mu F$

B. $5\mu F$

C. $80\mu F$

D. $20\mu F$

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71. When 20 V battery is connected to a circuit of capacitance (infinite ladder) as shown in the figure then charge supplied by the battery and total energy stored in the capacitors respectively are

A. $80\mu C$ and $800mJ$

B. $40\mu C$ and $400mJ$

C. $80\mu C$and$0.8mJ$

D. $80\mu C$ and $0.4mJ$

72. Four concentric conducting spherical shells A, B, C and D of radii a, 2a, 3a and 4a respectively. Shell B and D are given charges q and $-q$ respectively. If shell C is grounded then potential difference (VA — VC) is

A. A. $\frac{q}{12\pi\varepsilon_0 a}$

B. B. $\frac{q}{6\pi\varepsilon_0 a}$

C. C. $\frac{q}{24\pi\varepsilon_0 a}$

D. D. $\frac{q}{16\pi\varepsilon_0 a}$

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73. A capacitor is charged with a battery and energy stored is U. After disconnecting battery another capacitor of same capacity is connected in parallel with it. Then energy stored in each capacitor is:

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

B. $\frac{U}{4}$

C. $\frac{U}{8}$

D. zero

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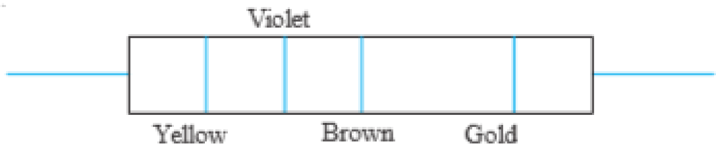
74. A carbon resistor has coloured strips as shown in figure. Its resistance is



A. $4.1(k\Omega(+ \; -)5\,\%$

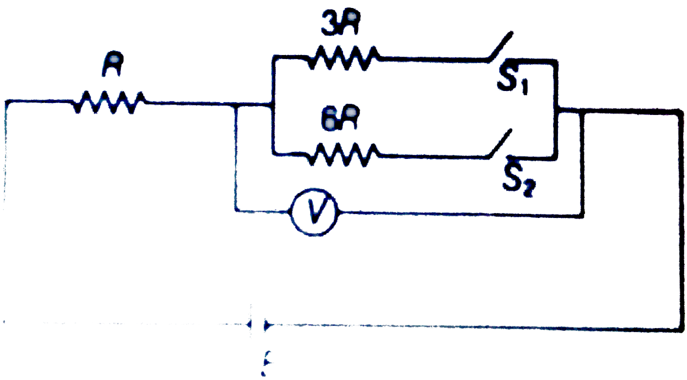
B. $4.1(k\Omega(+ \; -)10\,\%\,)$

C. $3.0(k\Omega(+ \; -)5\,\%\,)$

D. $5.0(k\Omega(+ \; -)5\,\%\,)$

Watch Video Solution

75. In the circuit shown in figure reading of voltmeter is V_1 when only S_1 is closed, reading of voltmeter is V_2 when only S_2 is closed and reading of voltmeter is V_3 when both S_1 and S_2 are closed. Then



A. $L_1 > L_2 > L_3$

B. $L_3 > L_2 > L_1$

C. $L_3 > L_1 > L_2$

D. $L_3 < L_2 < L_1$

Watch Video Solution

76. An electirc current $(/ = 6)$ A folows in a conducting wire of length 3.2 m. The total linear momentum of electrons in wire (in kg m $(s^{-1}\_))$ is approximately

A. (1.1×10^{-12})

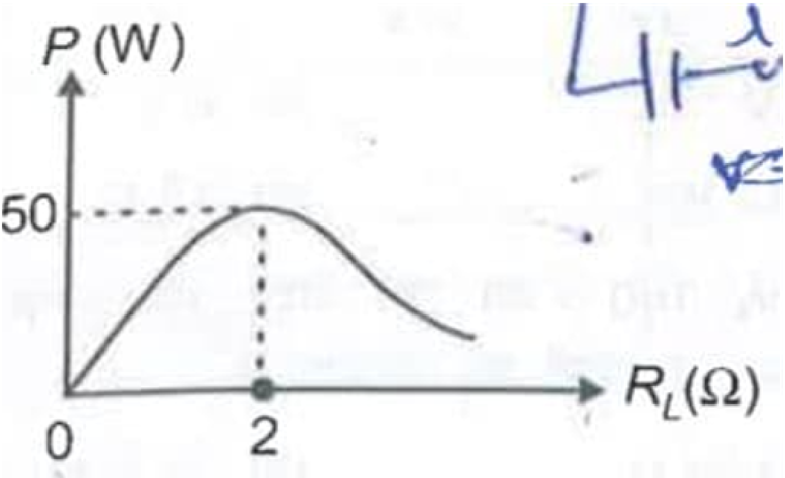
B. (1.1×10^{-10})

C. (2.9×10^{-12})

D. (2.1×10^{-10})

Watch Video Solution

77. A battery of emf (epsilon) and internal resistance r is connected across a load resistanvce (RundersetL). The plot between output power and load resistance is shown in the figure.



value of emf (ε) and internal resistance respectively will be

A. $20V, 2(\Omega)$

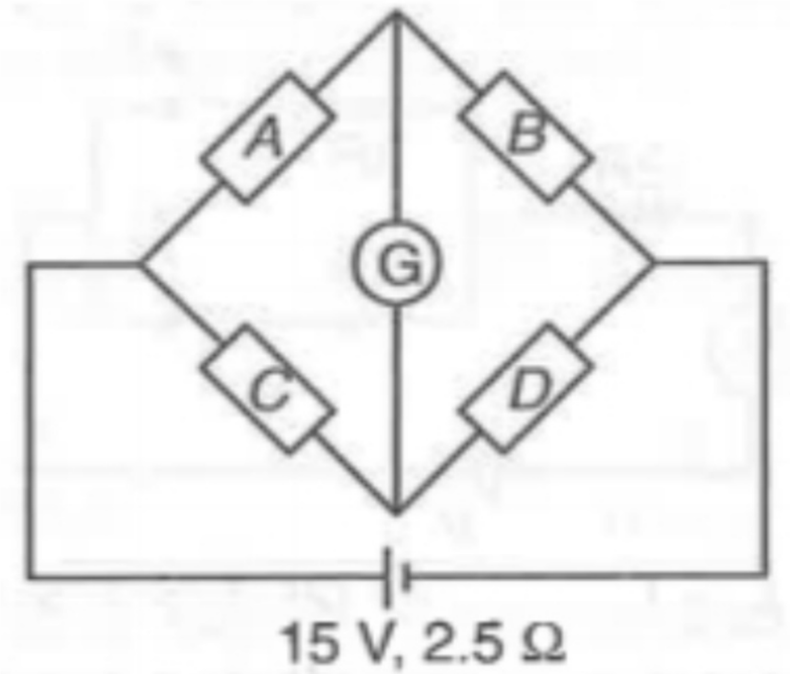
B. $10V, 2(\Omega)$

C. $20V, 1(\Omega)$

D. $10V, 1(\Omega)$

Watch Video Solution

78. The resistance of the four arms A, B, C and D of a wheatstone bridge as shown in the figure are $10\Omega, 20\Omega$, 30Ω and 60Ω respectively . The emf and internal resistance of the cell are $15V$ and 2.5Ω respectively . If the galvanometer resistance is 80Ω then the net current drawn from the cell will be



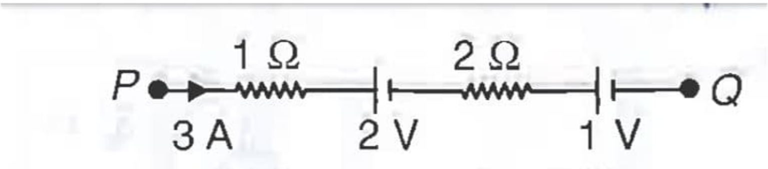
A. $0.4a$

B. $0.6A$

C. $0.5A$

D. $0.1A$

79. The potential difference $\left(V \underset{P}{-} V \text{ underset } Q\right)$ between the points P nad Q in the part of a circuit as shown in figure is



A. $6V$

B. $9V$

C. $(-)12V$

D. $12V$

Watch Video Solution

80. A $1600W$, $180V$ heater operates at $180V$. The resistance of heating coil is

A. $20.25(\Omega)$

B. $21.5(\Omega)$

C. $18(\Omega)$

D. $1200(\Omega)$

Watch Video Solution

81. A flow of (10^{12}) electron per minute in a conducting wire constitutes a current of

A. $(1.6 \times 10^{-7} A)$

B. $(1.6 \times 10^{-8} A)$

C. $(2.67 \times 10^{-9} A)$

D. $(2.67 \times 10^{-10} A)$

Watch Video Solution

82. Krichhoff's first law at a junction is based on conservation of

A. A. Angular momentum

B. B. Mass

C. C. Charge

D. D. Energy

Watch Video Solution

83. A wire of resistance(10Ω) is stretched to twice its original length. The resistance of half of the streached wire is

A. $10(\Omega)$

B. $20(\Omega)$

C. $40(\Omega)$

D. $80(\Omega)$

Watch Video Solution

84. The charger Q(in coulomb) flowing through a resistance $(R = 10\Omega)$ varies with time t(in second) as (Q= 2t-t^2). The total heat produced in resistance R is

A. $\left(\frac{40}{3}J\right)$

B. $\left(\frac{20}{3}J\right)$

C. $\left(\frac{80}{3}J\right)$

D. $\left(\frac{80}{7}J\right)$

Watch Video Solution

85. The reading of ammeter in the circuit shown in the figure is

A. $3(A)$

B. $2(A)$

C. $1.5(A)$

D. $2.5(A)$

Watch Video Solution

86. Two 220 volt, 200 W bulbs are connected first in series and then in parallel. Each time the combination is connected to 220 V. The ratio of power drawn by the combination in respective cases is

A. 2

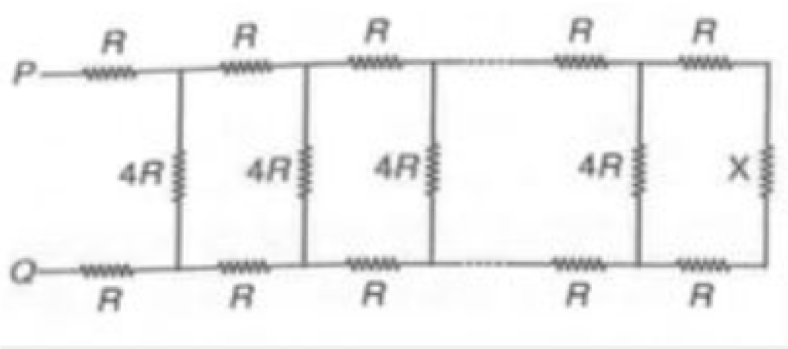
B. $\left(\frac{1}{2}\right)$

C. 4

D. $\left(\frac{1}{4}\right)$

Watch Video Solution

87. Consider the ladder network shown is the figure . The value of X, so that effective resistance between P and Q becomes independent of number of element in the combination is



A. R

B. 2R

C. $3R$

D. $8R$

Watch Video Solution

88. Two cities are 80 km apart. The electric power is sent from one city to another city through copper wires. The fall in potential per km is 8 V and average resistance per km is (0.25Ω). The power loss in wire is

A. $20.48kW$

B. $12.48kW$

C. $20.48W$

D. $12.48W$

Watch Video Solution

89. A carbon and an aluminium wire are connected in series. If the combination has equivalent resistance of (90Ω) at $(0^\circ C)$, the value of the resistance of each wire at$(0^\circ C)$ so that the resistance of combination does not change with temperature is

A. $R_{o,c} = \frac{80}{9}\Omega, R_{o,Al} = \frac{10}{9}\Omega$

B. $R_{o,c} = 80\Omega, R_{o,Al} = 10\Omega$

C. $R_{o,c} = \frac{730}{9}\Omega, R_{o,Al} = \frac{80}{9}\Omega$

D. $R_{o,c} = 10\Omega, R_{o,Al} = 80\Omega$

Watch Video Solution

90. The wire of same dimension but resistivities(p_1) and $(p_2)$are connected in parallel. The equivalent resistivity of the combination is

A. $\dfrac{p_1 + p_2}{2}$

B. $2(p_1 + p_2)$

C. $\dfrac{p_1 p_2}{p_1 + p_2}$

D.

Watch Video Solution

91. The current density (J) at cross-sectional area $\left(A = \left(2\hat{i} + 4\hat{j}\right)mm^2\right)$ is $\left(2\hat{j} + 2\hat{k}\right)A/m^2$. The current flowing through the cross-sectional area is

A. $(12\mu A)$

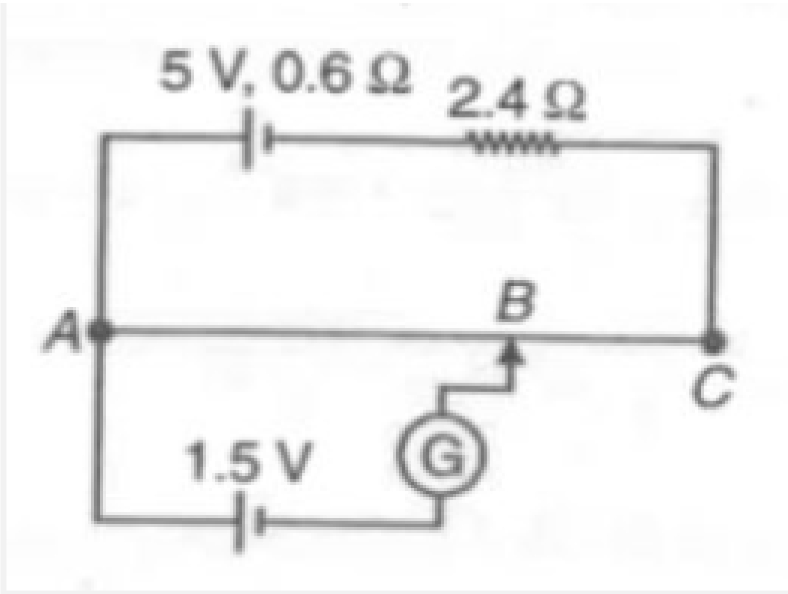
B. $(8\mu A)$

C. $(4\mu A)$

D. Zero

Watch Video Solution

92. A simple potentiometer circuit is shown in the figure. The internal resistance of 5 V battery is 0.6Ω wire of length $4m$ and resistance 0.5Ω per meter. The length AB for which galvanometer shows zero deflection is



A. $180cm$

B. $300cm$

C. 260 cm

D. $200cm$

93. The mixed grouping of practical cells are shown in the figure. The given combination can be replaced by an efffective cell between A and B having emf E and internal resistance r, then choose the correct option

A. $E = 4V$, r = (2Ω)

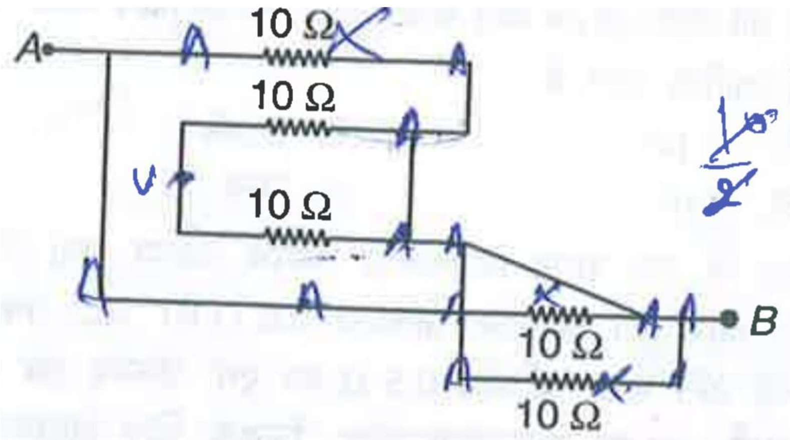
B. E = 4 V, r =(1Ω)

C. E = 80 V, r = (2Ω)

D. E = 80 V, r = (1Ω)

Watch Video Solution

94. The equivalent resistance between point A and B in the circuit shown in figure is



A. (30Ω)

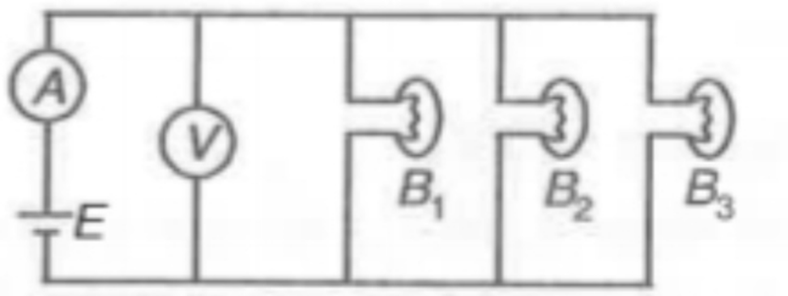
B. $(40O\omega)$

C. (2Ω)

D. Zero

Watch Video Solution

95. Three identical bulbs are connected in parallel across an ideal sources of emf E .The ammeter A and voltmeter V are ideal . If bulb B_3 gets fused, then



A. Reading of A will increase but that of V will remain same

B. Reading of A will decrease but that of V will Increase

C. Reading of A will decrease but that of V will remains same

D. Reading of both A and V will decrease

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96. A wire of resistance(3Ω) per meter is bent to from a regular hexagon of side 2 m. The resistance between points A and B as shown in figure is

A. (12Ω)

B. (8Ω)

C. (4Ω)

D. (24Ω)

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97. A group of six identical cells each of emf E and internal resistance r are joined in series to form a loop. The terminal voltage across each cells is

A. E

B. 6E

C. $\left(\frac{E}{6}\right)$

D. Zero

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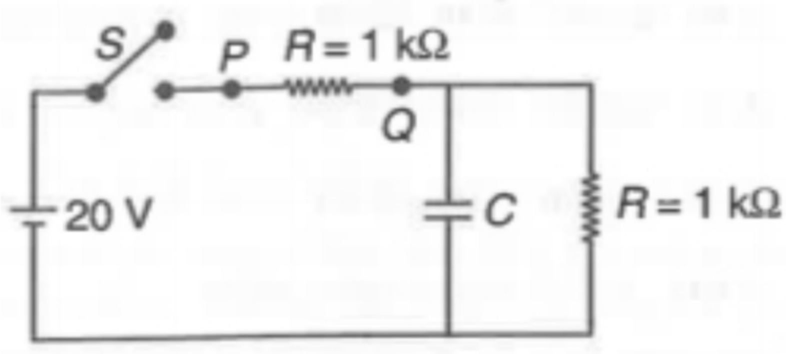
98. In the given circuit, the switch S is closed at time $t = 0$ then select the correct statement for current I in resistance PQ as shown in the figure



A. I $= 20 mA$ for all time t

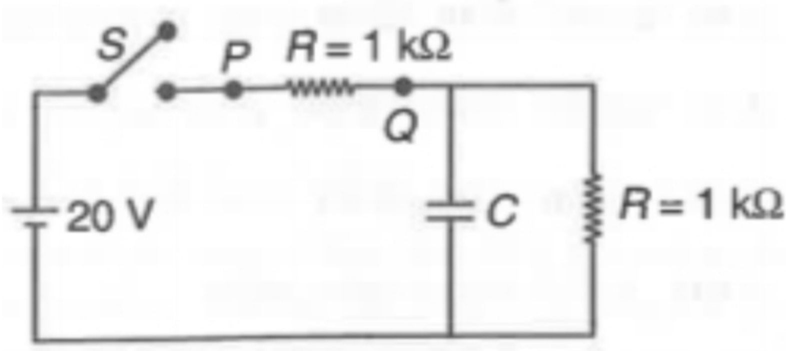
B. I =10 mA for all time t

C. I = 20 mA at t = 0 and with it goes to 10 mA

D. I oscillates between 10 mA and 20 mA

Watch Video Solution

99. In the given circuit, the switch S is closed at time $t = 0$ then select the correct statement for current I in resistance PQ as shown in the figure



A. $I = 20$ mA for all time t

B. $I = 10$ mA for all time t

C. $I = 20$ mA at $t = 0$ and with the time it goes to $10 mA$

D. I oscillates between $10 mA$ and $20 mA$

Watch Video Solution

100. A group of six identical cells each of emf E and internal resistance r are joined in series to form a loop. The terminal voltage across each cells is

A. E

B. $6E$

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

D. Zero

Watch Video Solution

101. A wire of resistance(3Ω) per meter is bent to from a regular hexagon of side 2 m. The resistance between points A and B as shown in figure is

A. 12Ω

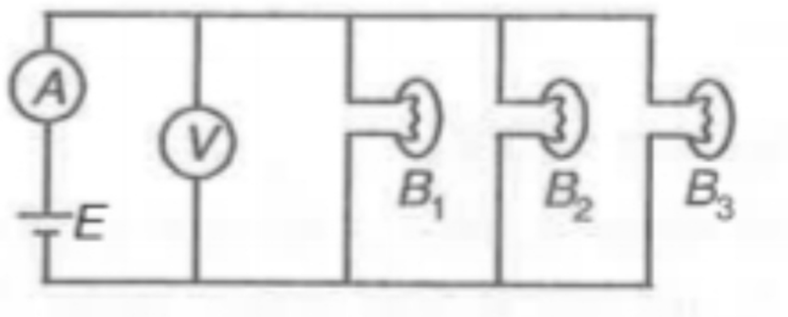
B. 8Ω

C. 4Ω

D. 24Ω

Watch Video Solution

102. Three identical bulbs are connected in parallel across an ideal sources of emf E .The ammeter A and voltmeter V are ideal . If bulb B_3 gets fused, then



A. Reading of A will increase but that of V will remains same

B. Reading of A will decrease but that of V will increase

C. Reading of A will decrease but that of V will remains same

D. Reading of both A and V will decrease

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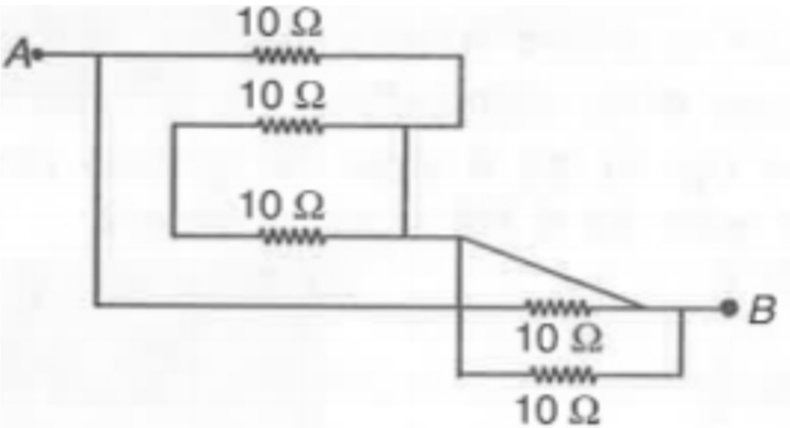
103. The equivalent resistance between points A and B in the circuit shown in figure is



A. 30Ω

B. 40Ω

C. 2Ω

D. Zero

Watch Video Solution

104. The mixed grouping of practical cells are shown in the figure. The given combination can be replaced by an efffective cell between A and B having emf E and internal resistance r, then choose the correct option

A. $E = 4V$, $r = 2\Omega$

B. $E = 4V$, $r = 1\Omega$

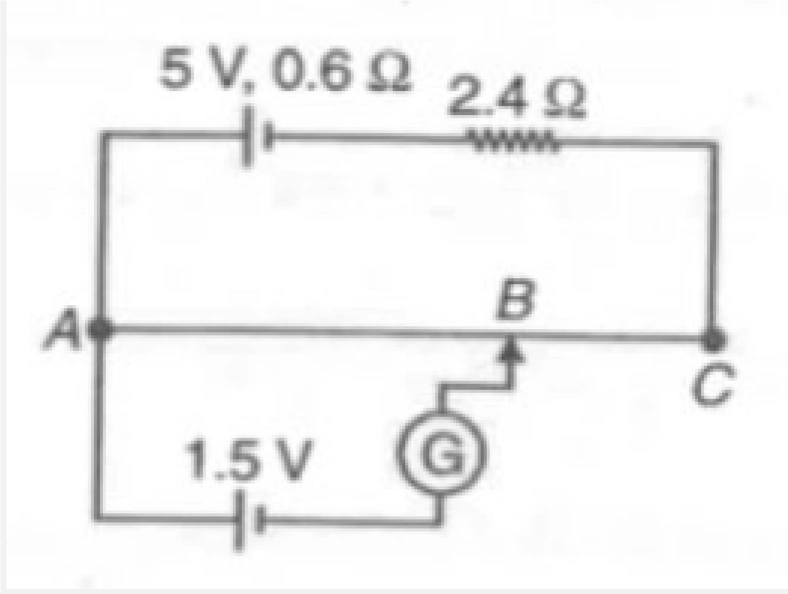
C. $E = 8V$, $r = 2\Omega$

D. $E = 8V$, $r = 1\Omega$

Watch Video Solution

105. A simple potentiometer circuit is shown in the figure. The internal resistance of 5 V battery is 0.6Ω wire of length $4m$ and resistance 0.5Ω per meter. The length

AB for which galvanometer shows zero deflection is



A. $180 cm$

B. $300 cm$

C. $260 cm$

D. $200 cm$

Watch Video Solution

106. The current density vecJ at cross sectional area $\overrightarrow{A} = \left(2\hat{i} + 4\hat{j}\right)mm^2$ is $\left(2\hat{j} + 2\hat{k}\right)Am^{-2}$. The current following through the cross-sectional area is

A. $12\mu A$

B. $8\mu A$

C. $4\mu A$

D. Zero

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107. The wires is of same dimension but resistivities ρ_1 and ρ_2 are connected in parallel . The equivalent resistivity of the combination is

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108. A carbon and an aluminium wire are connected in series. If the combination has resistance of 30Ω at $30^\circ C$, what is the resistance of each wire at $0^\circ C$so that resistance of the combination does not change with temperature.

$(a_c = -0.5 \times 10^{-3} / ^\circ C, a_A = 4 \times 10^{-3} / ^\circ C)$

A. $R_{0,c} = \frac{80}{9}\Omega, R_{0,Al} = \frac{10}{9}\Omega$

B. $R_{0,c} = 80\Omega, R_{0,Al} = 10\Omega$

C. $R_{0,c} = \frac{730}{9}\Omega, R_{0,Al} = \frac{80}{9}\Omega$

D. $R_{0,c} = 10\Omega, R_{0,Al} = 80\Omega$

Watch Video Solution

109. Two cities are $80km$ apart . The electric power is sent from one City to another city through copper wires . The fall of potential per km is $8V$ and average resistance per km is 0.25ω. The power loss in wire is

A. $20.48kW$

B. $12.48kW$

C. $20.48W$

D. $12.48W$

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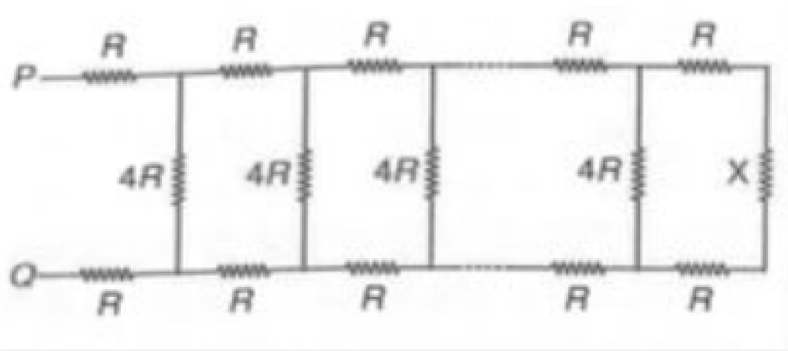
110. Consider the ladder network shown is the figure . The value of X, so that effective resistance between P and Q becomes independent of number of element in the combination is



A. R

B. $2R$

C. $4R$

D. $8R$

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111. Two 220 volt, 200 W bulbs are connected first in series and then in parallel. Each time the combination is connected to 220 V. The ratio of power drawn by the combination in respective cases is

A. 2

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

C. 4

D. $\left(\frac{1}{4}\right)$

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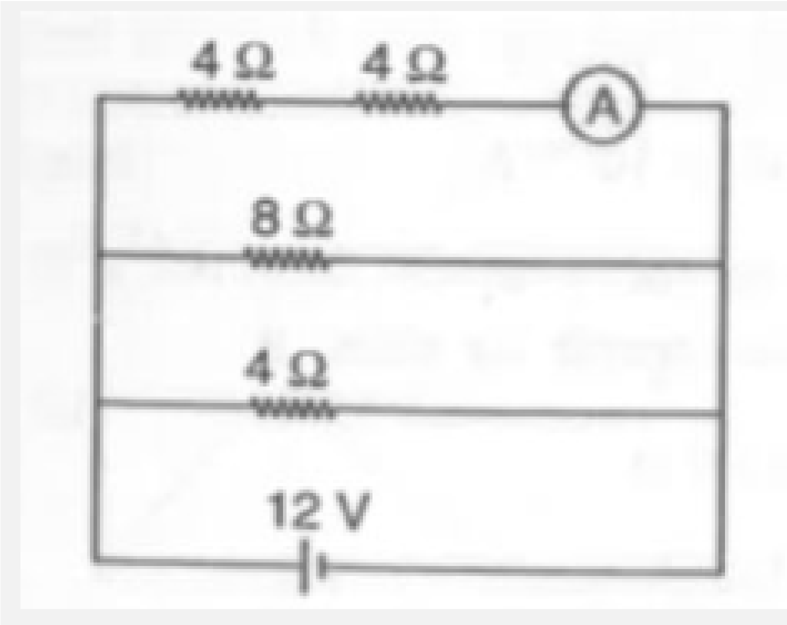
112. The reading of ammeter in the circuit shown in the figure is



A. $3A$

B. $2A$

C. $1.5A$

D. $2.5A$

113. The charge Q(in coulomb) flowing through a resistance $R = 10\Omega$ varies with time t (in second) as $Q = 2t - t^2$. The total heat produced in resistance R is

A. $\frac{40}{3}J$

B. $\frac{20}{3}J$

C. $\frac{80}{3}J$

D. $\frac{80}{7}J$

114. A resistance 10Ω is stretched to twice its original length . The resistance of the stretched wire is

A. 10Ω

B. 20Ω

C. 40Ω

D. 80Ω

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115. Krichhoff's first law at a junction is based on conservation of

A. Angular momentum

B. Mass

C. Charge

D. Energy

Watch Video Solution

116. A flow of 10^{12} electrons per minute in a conducting wire constitutes a current of

A. $1.6 \times 10^{-7} A$

B. $1.6 \times 10^{-8} A$

C. $2.6 \times 10^{-9} A$

D. $2.67 \times 10^{-10} A$

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117. A $1600W$, $180V$ heater operates at $180V$. The resistance of heating coil is

A. 20.25Ω

B. 21.5Ω

C. 18Ω

D. 1200Ω

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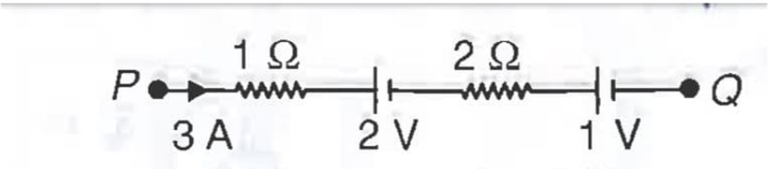
118. The potential difference $\left(V_{P} - V \text{ underset } Q\right)$ between the points P nad Q in the part of a circuit as shown in figure is



A. $6V$

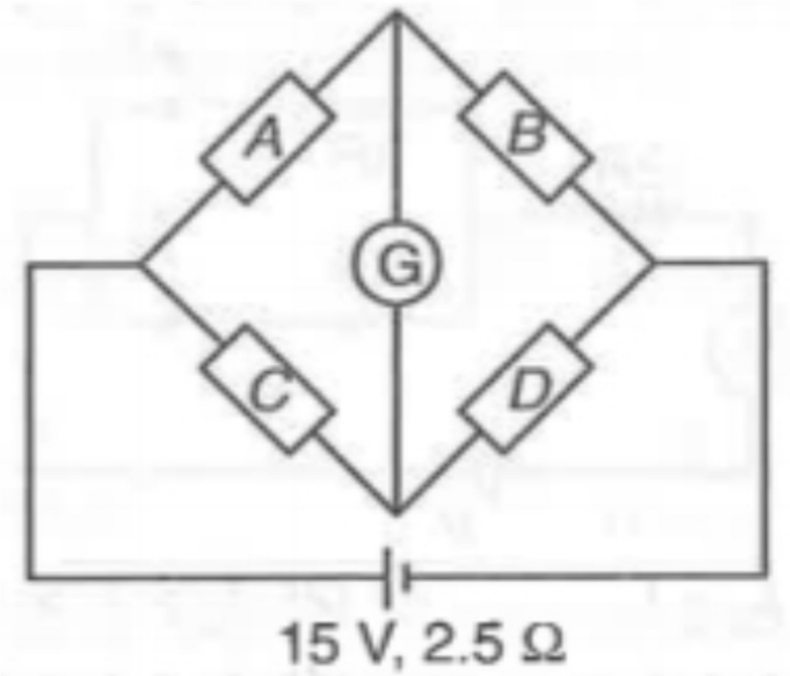
B. $9V$

C. $-12V$

D. $12V$

Watch Video Solution

119. The resistance of the four arms A, B, C and D of a wheatstone bridge as shown in the figure are $10\Omega, 20\Omega$, 30Ω and 60Ω respectively . The emf and internal resistance of the cell are $15V$ and 2.5Ω respectively . If the galvanometer resistance is 80Ω then the net current drawn from the cell will be



A. $0.4A$

B. $0.6A$

C. $0.5A$

D. $0.1A$

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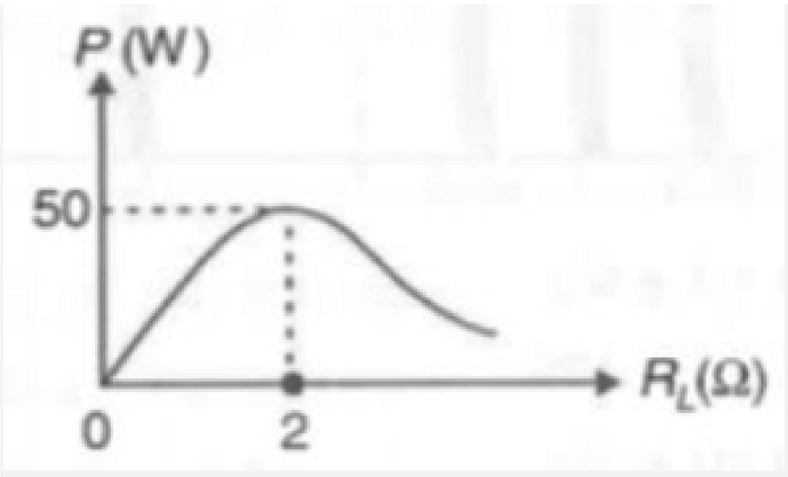
120. A battery of emf epsilon and internal resistance r is connected across a load resistance R_L . The plot between output power and load resistance is shown in the figure. The value of emf epsilon and internal resistance r respectively will



A. $20V, 2\Omega$

B. $10V, 2\Omega$

C. $20V, 1\Omega$

D. $10V, 1\Omega$

Watch Video Solution

121. An electirc current $(/ = 6)$ A folows in a conducting wire of length 3.2 m. The total linear momentum of electrons in wire (in kg m $\left(s^{-1}\_\right))$ is approximately

A. $1.1 \cdot 10^{-12}$

B. $1.1 \cdot 10^{-10}$

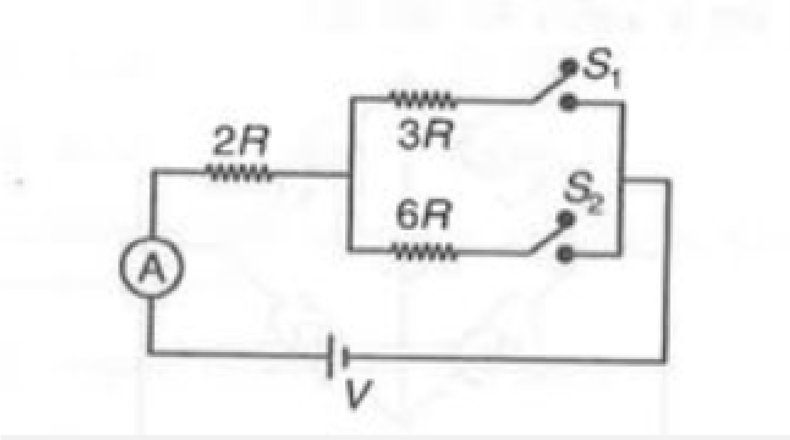
C. $2.9 \cdot 10^{-12}$

D. $2.1 \cdot 10^{-10}$

Watch Video Solution

122. In the circuit shown in the figure, reading of ammeter is I_1 when only S_1 is closed, reading of of ammeter is is I_2 when only S_2 is closed and reading of

Ammeter,is I_3 when both S_1 and S_2 are closed then



.

A. $I_1 > I_2 > I_3$

B. $I_3 > I_2 > I_1$

C. $I_3 > I_1 > I_2$

D. $I_3 < I_1 < I_2$

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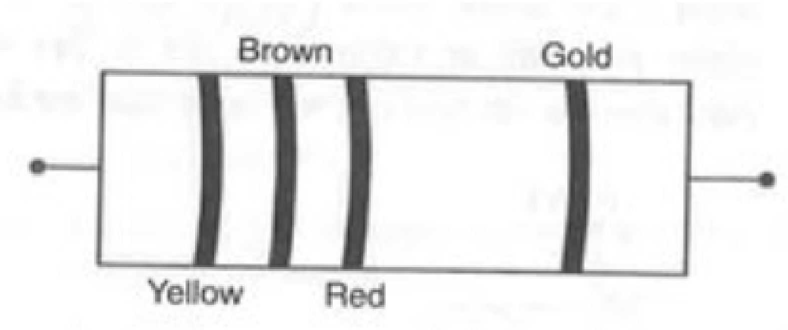
123. A carbon registor has colour bands as shown in the figure. Its resistance is



A. $4.1 k\Omega \pm 5\%$

B. $4.1 k\Omega \pm 10\%$

C. $3.0 k\Omega \pm 5\%$

D. $5.0 k\Omega \pm 5\%$

Watch Video Solution

124. A capacitor is charged using a a battery and energy stored is U. After disconnecting the battery another uncharged capacitor of same capacitance is connected in parallel to the first capacitor. Then loss of energy is equal to

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

B. $\frac{U}{4}$

C. $\frac{U}{8}$

D. Zero

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125. Four concentric conducting spherical shells A, B, C and D of radii a, 2a, 3a and 4a respectively. Shell B and D are given charges q and $-q$ respectively. If shell C is grounded then potential difference (VA — VC) is

A. $\frac{q}{12\pi\varepsilon_0 a}$

B. $\frac{q}{6\pi\varepsilon_0 a}$

C. q/(24pi varepsilon_0a)'

D. $\frac{q}{16\pi\varepsilon_0 a}$

Watch Video Solution

126. When 20 V battery is connected to a circuit of capacitance (infinite ladder) as shown in the figure then charge supplied by the battery and total energy stored in the capacitors respectively are

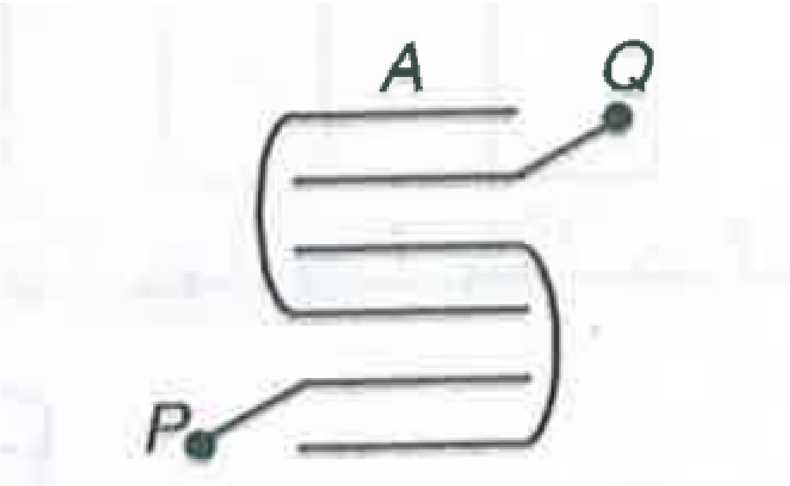
A. 80 muC and 800mJ

B. 40 muC and 400mJ

C. $80\mu C$ and $0.8mJ$

D. $40\mu C$ and $0.4mJ$

127. Six identical metal plates are arranged as shown in the figure. Each plate have area A and are placed at distance d with each other. The equivalent capacitance between P and Q



A. $\frac{Var\varepsilon_0 A}{d}$

B. $\frac{2\varepsilon_0 A}{d}$

C. $\frac{3\varepsilon_0 A}{d}$

D. $\frac{\varepsilon_0 A}{d}$

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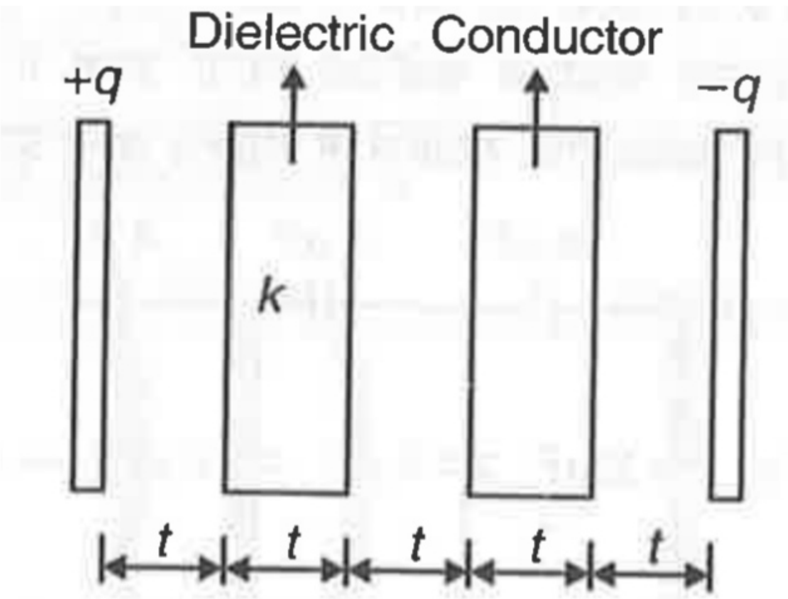
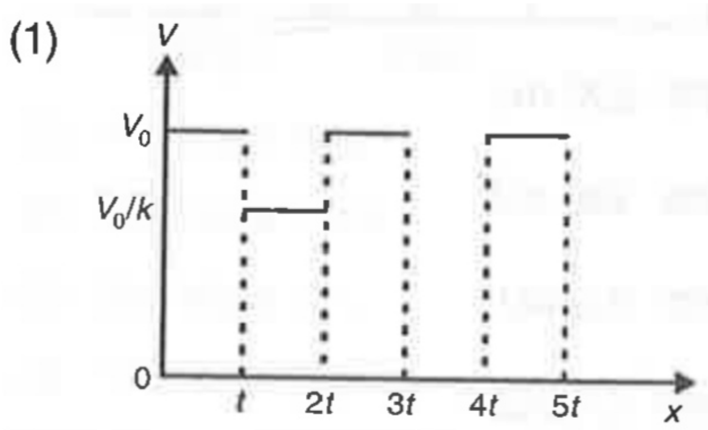
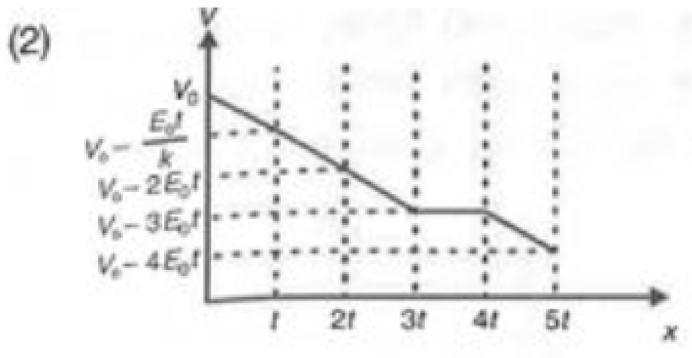
128. A dielectric slab of thickness t of dielectric constant k and a conducting plate of same thickness is inserted between two parallel conducting plates of cross - section area A and charge q and -q as shown in figure.



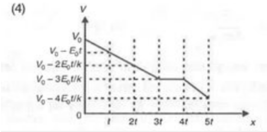
The

distance between two plates is $5t$. The potential - distance $(V - x)$ graph will be (Consider potential of positive plate is V_0 and position$x = 0$,E_0 is electric field in free space)

A. 

B. 

C.

D. 

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129. A capacitive network of complex combination is shown in the figure. The energy stored in 4 muF capacitor is

A. $200\mu J$

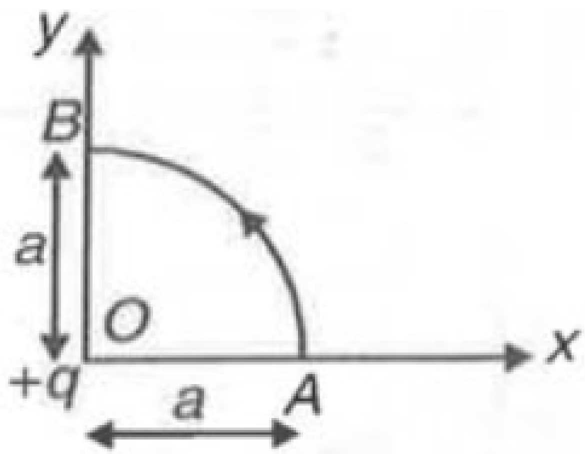
B. $400\mu J$

C. $100\mu J$

D. $600\mu J$

Watch Video Solution

130. A point charge +q is placed at origin O. The work done in taking another point charge -q from the point A to point B along the circular arc as shown in the figure



is ____________.

A. $\dfrac{-q^2}{4\pi\varepsilon_0 a}$

B. $\dfrac{+q^2}{4\sqrt{2\pi\varepsilon_0 a}}$

C. $\frac{-\sqrt{2}q^2}{4\pi\varepsilon_0 a}$

D. Zero

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131. A parallel plate capacitor with liquid filled between the plates (dielectric constant of liquid, $k = 4$)has capacitance $20\mu F$. If the liquid is removed then capacitance of capacitor becomes

A. $10\mu F$

B. $5\mu F$

C. $80\mu F$

D. $20\mu F$

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132. A non-conducting sphere of radius R is given a charge Q. Charge is uniformly distributed in its volume. The electric potential at centre and at the surface of sphere respectively are

A. Zero and $\frac{Q}{4\pi\varepsilon_0 R}$

B. $\frac{Q}{4\Pi\varepsilon_0 R}$ and Zero

C. $3\frac{Q}{4\pi\varepsilon_0 R}$ and $\frac{Q}{4\pi\varepsilon_0 R}$

D. $3\frac{Q}{8\pi\varepsilon_0 R}$ and $\frac{Q}{4\pi vareosilon_0 R}$

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133. For the given circuit, the total energy stored in the circuit when a $12V$ battery is connected.$(C = 10\mu F)$

A. $360\mu J$

B. $180\mu J$

C. $720\mu J$

D. Zero

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134. A wire of length l and charge q is bent in form of a semicircle. The charge is uniformly distributed over the length. The electric field at the centre of semicircle is

A. $\frac{q}{\varepsilon_0 l^2}$

B. $\frac{q}{2\varepsilon_0 l^2}$

C. $\frac{q}{4\pi\varepsilon_0 l^2}$

D. $\frac{q}{2\pi\varepsilon_0 l^2}$

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135. A hollow conducting sphere of radius 3 m is given a positive charge of 1 muC. Choose the correct plot of electric field (E) along x axis with position (x) from centre of sphere $(0, 0, 0)$

A.

B.

C.

136. An electric dipole of dipole moment $\overrightarrow{P}$ is lying along uniform electric filed $\overline{E}$. The work done in rotating the dipole by 37° is

A. $\frac{2}{5}PE$

B. $-\frac{2}{5}PE$

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

D. $\frac{3}{5}PE$

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137. A positive charge q is enclosed by a Guassian spherical surface of radius 'a' . If its radius is increased to 4a then the net outward flux will

A. Become four time

B. Become two times

C. Become sixteen times

D. Remain same

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138. A small metallic bob of mass m of a simple pendulum of length L is suspended between the two oppositely charged large parallel plates . The electric field E act vertically. If positive charge 'q' is given to bob and displaced slightly from mean position then time period of oscillation will be

A. $T = 2\pi\sqrt{\frac{L}{g - \frac{qE}{m}}}$ when lower plate is charged positively

B. $T = 2\pi\sqrt{\frac{L}{g - \frac{qE}{m}}}$ when lower plate is charged negatively

C. $T = 2\pi\sqrt{\frac{L}{g + \frac{qE}{m}}}$ when lower plate is charged negatively

D. Both (1) and (3)

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139. Two identical balls each having a density ρ are suspended from a common point by two insulating string of equal length. Both the balls have equal mass and charge. In equilibrium each string makes an angle θ with vertical. Now, both the balls are immersed in a liquid. As a result the angle θ does not change. The density of the liquid is σ. find the dielectric constant of the liquid.

A. $\dfrac{\sigma}{\rho - \sigma}$

B. $\dfrac{\rho}{\rho - \sigma}$

C. $\dfrac{\sigma}{\rho}$

D. $\dfrac{\rho}{\sigma}$

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140. The field lines corresponding to an electric filed is shown in the figure then (E denotes electric field and V denotes electric potential)

A. $E_A = E_B = E_C$ and $V_A > V_B > V_C$

B. $E_A = E_B > E_C$ and $V_A < V_B < V_C$

C. $E_A = E_C > E_B$ and $V_A > V_B > V_C$

D. $E_A = E_C < E_B$ and $V_A > V_B > V_C$

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141. A uniform electric field E is created between two parallel

., charged plates as shown in figure . An electron

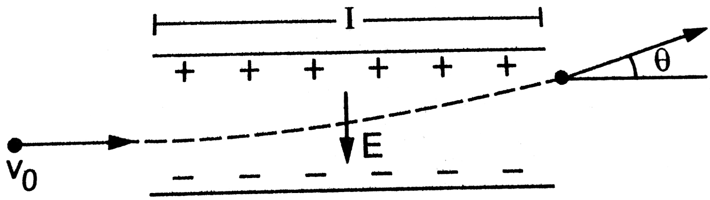
. enters the field symmetrically between the plates with a

. speed `v_(0)'. The length of each plate is l. Find the

angle of

. deviation of the path of the electron as it comes out

. of the field.



A. $\tan^{-1}\left(\frac{eEl}{2mv_0^2}\right)$

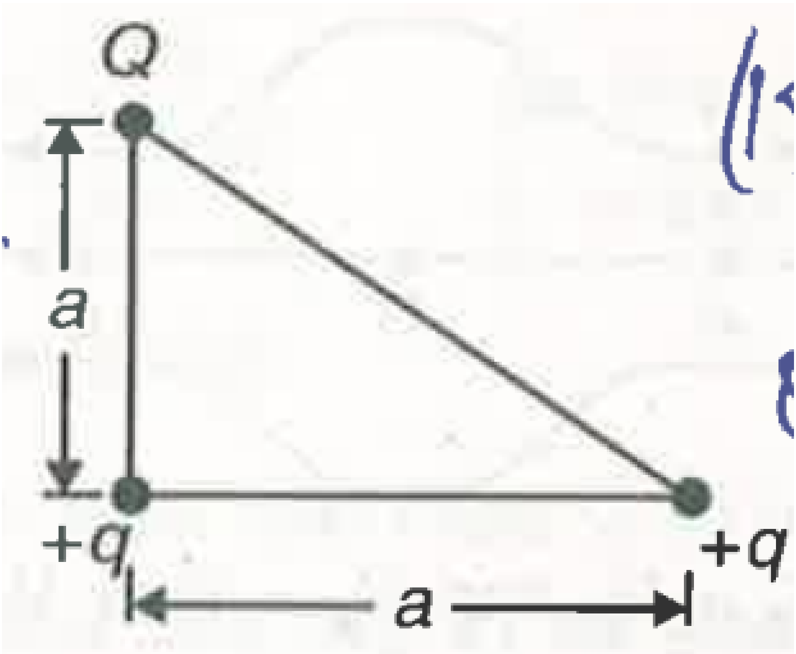
B. $\tan^{-1}\left(\frac{eEl}{mv_0^2}\right)$

C. $\sin^{-1}\left(\frac{eEl}{mv_0^2}\right)$

D. $\sin^{-1}\left(\frac{eEl}{2mv_0^2}\right)$

Watch Video Solution

142. Three charges +q , +q, and Q are placed at the comers of a right angled isosceles triangle as shown in the figure. If the net potential energy of the system is zero then value of Q is



A. $-2q$

B. $\dfrac{-2q}{\sqrt{2}+2}$

C. $\dfrac{-q}{\sqrt{2}+1}$

D. $-q$

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143. an electric dipole is placed in an electric field generated by a point charge

A. The net electric force on the dipole must be zero

B. The net electric force on the dipole may be zero

C. The torque on the dipole due to the field may be zero

D. Both (2) and (3)

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144. A particle of mass m moves in the XY plane with constant velocity v along the straight line PQ as shown in the figure. Its angular momentum with respect to origin O is(θ is angle between $\vec{v}$ and x-axis)

A. mvb

B. mvb $\sin\theta$

C. mvb $\cos\theta$

D. mvb $\tan\theta$

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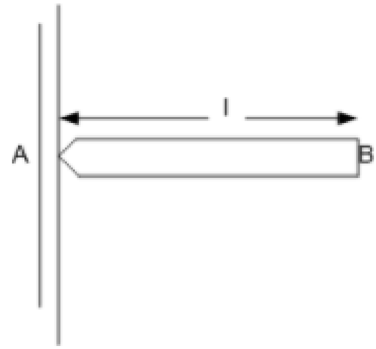
145. A uniform rod AB of length l and mass m is free to rotate about an Axis passing through A and perpendicular to length of the rod. The rod is released from rest as shown in figure. Given that the moment of inertia of the rod about A is $\frac{ml^2}{3}$ The initial angular



acceleration of the rod will be

A. $\frac{3g}{2l}$

B. $\frac{3g}{l}$

C. $\frac{6g}{l}$

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

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146. Two persons A and B are standing at the two opposite ends of a plank of length 4 m as shown in the figure. Plank is kept on a frictionless horizontal surface. Displacement of Plank, when A and B interchange their positions on the plank is (given $m_A = 40$ kg, $m_B = 60$ kg, $m_{plank} = 20$ kg)

A. $\frac{2}{5}$ m

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

C. $\frac{4}{5}$m

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

147. Four identical uniform thin rods, each of mass m and length l are joined to a common point O as shown in the figure. Moment of inertia of the system about an axis passing through O and lying in the plane of rods is

A. $\frac{1}{3}ml^2$

B. ml^2

C. $\frac{4}{3}\frac{m}{l^2}$

D. $\frac{2}{3}\frac{m}{l^2}$

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148. A uniform thin spherical shell of mass m and radius R rolls down without slipping over an inclined plane of angle θ with the horizontal. The ratio of rotational kinetic energy to the total kinetic energy of the shell will be

A. $2:5$

B. $2:7$

C. $5:7$

D. $3:5$

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149. A uniform disc is released from the top of a rough inclined plane of angle θ and height h. The coefficient of friction between the disc and the plane is $\mu = \frac{\tan\theta}{4}$. The speed of centre of mass of disc on reaching the bottom of the plane is

A. $\sqrt{\left(4g\frac{h}{3}\right)}$

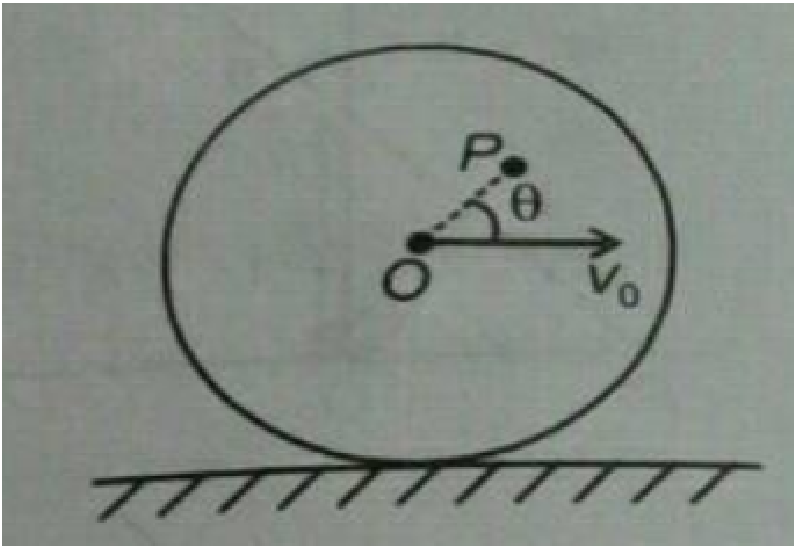
B. $\sqrt{3g\frac{h}{2}}$

C. $\sqrt{3g\frac{h}{4}}$

D. $\sqrt{2g\frac{h}{3}}$

Watch Video Solution

150. A uniform disc of radius R is in pure rolling on a fixed horizontal surface with constant speed v_0 as shown in the figure. For what value of θ, speed of point P will be $\frac{v_0}{2}\sqrt{(5+2\sqrt{3})}$? (OP= R/2 and O is the centre of disc)



A. 30°

B. 45°

C. 60°

D. 53°

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151. Two point masses m and 4m are connected by a light rigid rod of length l at the opposite ends. Moment of inertia of the system about an axis perpendicular to the length and passing through the centre of mass is

A. $\frac{5ml^2}{4}$

B. $\frac{4ml^2}{5}$

C. $\frac{4ml^2}{3}$

D. $\frac{4ml^2}{7}$

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152. Angular momentum of a rigid body rotating about a fixed Axis with angular velocity $\vec{\omega}$

A. is always in the direction of $\vec{\omega}$

B. Is always in the direction perpendicular to $\vec{\omega}$

C. May or may not be in the direction of $\vec{\omega}$

D. Is always in the direction opposite of $\vec{\omega}$

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153. At what temperature in C the rms speed of gaseous hydrogen molecules equal to that of oxygen molecules at 79 C?

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154. A uniform rod mass m and length l is provided at one end and is rotated with constant angular velocity ω in a horizontal plane. Tension in the rod at a distance (√3l/2) from pivoted end is (Assume gravity free space)

A. $\frac{m\omega^2 l}{2}$

B. $\frac{m\omega^2 l}{4}$

C. $\frac{m\omega^2 l}{8}$

D. $\frac{3}{4}(m\omega^2 l)$

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155. Pseudo force is applied in

A. Frame of reference at rest with respect to an inertial frame

B. Frame of reference moving with constant velocity with respect to an inertial frame

C. Frame of reference moving with accelerated with respectr to an inertial frame

D. Both (1) and (2)

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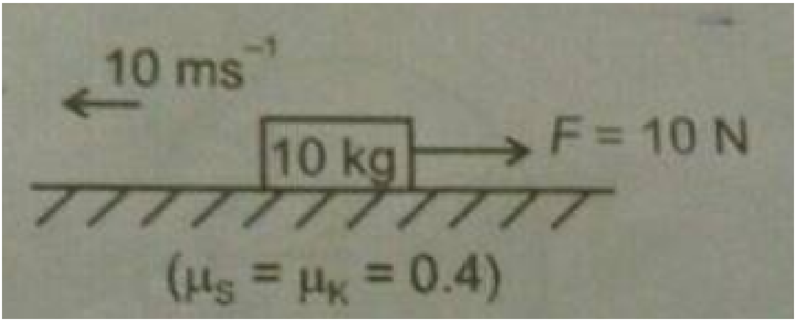
156. A block of mass $10kg$ is moving on a rough horizontal surface as shown in figure. At $t = 0$, velocity of block is $10\frac{m}{s}$ towards left and a constant force $F = 10N$ acts horizontally towards right. Acceleration of the block at $t = 3s$ is $(g = 10ms^{-2})$



A. $5ms^{-2}$

B. $4ms^{-2}$

C. Zero

D. $3ms^{-2}$

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157. A small block of mass m has speed $\frac{\sqrt{gR}}{2}$ at the top most point of a fixed hemisphere of radius R as shown in figure. The angle θ, when block loses the contact with the hemisphere is

A. $(\cos(0.75))^{-1}$

B. $(\cos(0.8))^{-1}$

C. $(\cos(0.6))^{-1}$

D. $(\cos(0.9))^{-1}$

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158. Select the correct statement out of the following

A. In an elastic collision, momentum of each body remain conserved

B. In an elastic collision total kinetic energy is not conserved during the short time of collision

C. In an elastic collision, final kinetic energy is always less than initial kinetic energy of the system

D. All of these

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159. A block of mass m is kept over another block of mass 2m. Coefficient of friction between two blocks is μ and that of between lower blood from the horizontal surface is zero. A horizontal force $F = \frac{4}{3}\mu mg$ is applied on the block of mass $2m$. Acceleration of lower block is

A. μg

B. $\frac{\mu g}{2}$

C. $\frac{2\mu g}{9}$

D. $\frac{4\mu g}{9}$

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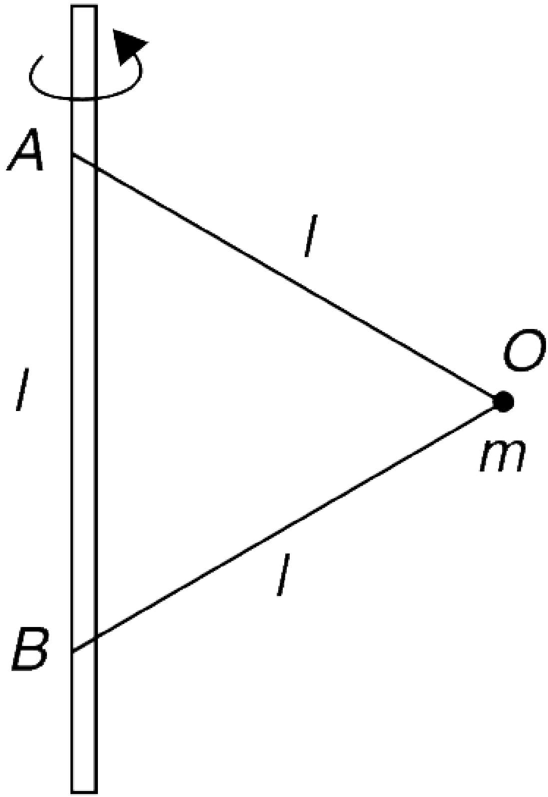

160.

A ball of mass m is rotated by an angular velocity of ω by means of two massless strings of equal length l is connected to a vertical rotating rod. The strings are tied to rod with a separation l. Select the correct relationship.

A. $T_1 > T_2$

B. $T_2 > T_1$

C. $T_2 = T_1$

D. $T_1 = \frac{T_2}{6}$

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161. A block of mass m is connected with another block of mass 2m kept on a rough horizontal table by means of an ideal spring of spring constant K and a massless string as shown in the figure. The minimum coefficient of friction between the block of mass $2m$ and the table so that the block does not slide, when block of mass m is suddenly released, is

A. $\frac{1}{4}$

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

C. 1

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

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162. A disc is in pure rolling motion on a rough horizontal surface. It enters into a frictionless horizontal surface. What will happen?

A. the disc will rotate faster

B. the disc will translate faster

C. The disc will be in pure rolling motion without any change

D. The disc will have translation once it enters surface

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163. If angular velocity of a particle having position vector $\overrightarrow{r} = \left(2\hat{i} - 2\hat{j} + 2\hat{k}\right)m$ about the origin is

$\vec{w} = \left(2\hat{i} - 2\hat{j} - \hat{k}\right) ra\frac{d}{s}$ then magnitude of linear velocity of the particle will be

A. $6\sqrt{2}$ m/s

B. $4\sqrt{2}$ m/s

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

D. $4\sqrt{3}$ m/s

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164. The radius of gyration of a uniform rod of mass m and length l about an axis perpendicular to its length and at distance $\frac{l}{4}$ from its centre will be

A. $\frac{l}{2}\sqrt{\frac{7}{3}}$

B. $l\sqrt{\frac{7}{3}}$

C. $2l\sqrt{\frac{7}{3}}$

D. $\frac{l}{4}\sqrt{\frac{7}{3}}$

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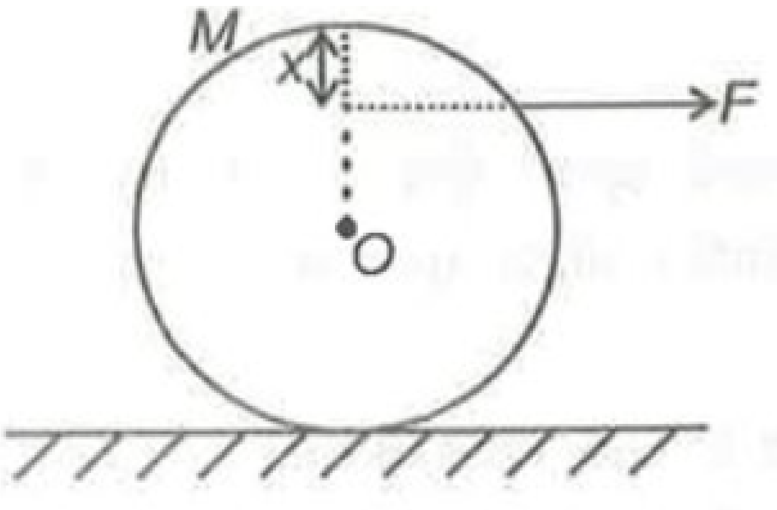
165. A hollow sphere of mass 'm' and radius 'R' are placed on horizontal surface and a horizontal force 'F' starts acting at a distance 'x' from its top most as shown in the figure.The value of 'x' such that hollow sphere starts pure rolling without use of friction is



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

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

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

D. $\frac{3R}{5}$

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166. A person is spinning with his hands outstretched at the rate of 3 rad/s.When he brings his hands close to the body,he spins at the rate of 9 rad/s.The ratio of initial rotational kinetic energy to final rotational kinetic energy of the person is

A. $1:2$

B. $1:3$

C. $2:3$

D. $1:9$

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167. A wheel having moment of inertia $\frac{2}{\pi^2}\ kgm^2$ is at rest. It is rotated by a 60 W ideal motor for one minute. The angular displacement traversed by the wheel in one minute is

A. $900\pi rad$

B. $1200\ \pi$ rad

C. $1800\ \pi$ rad

D. $2400\ \pi$ rad

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168. A wheel of radius 20 cm and moment of inertia 1 kgm^2 can rotate about its centre.A string is wrapped over its rim and is pulled by a force 'F' tangential to the rim of wheel.If angular acceleration produced is 2 rad/s^2 then the value of force 'F' is

A. A. 10 N

B. B., 20 N

C. C. 5 N

D. D. 15 N

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169. A block of mass $2kg$ is connected with a spring having spring constant 200 N/m held in equilibrium between two vertical walls 'A' and 'B' as shown as in figure.If compression in the spring is 4 cm and all the surfaces are smooth then normal reaction by the block on the wall `B' will be

A. 8 N

B. 16 N

C. 4 N

D. 12 N

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170. A block of mass 2kg released from the top of a smooth fixed wedge inside the elevator which is moving downward with an acceleration a = 5 m/s^2 as shown in the figure.The value of acceleration of the block w.r.t wedge will be (g = 10 m/s^2)

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

B. 5 m/s^2

C. 2.5 m/s^2

D. $5\sqrt{2}$ m/s^2

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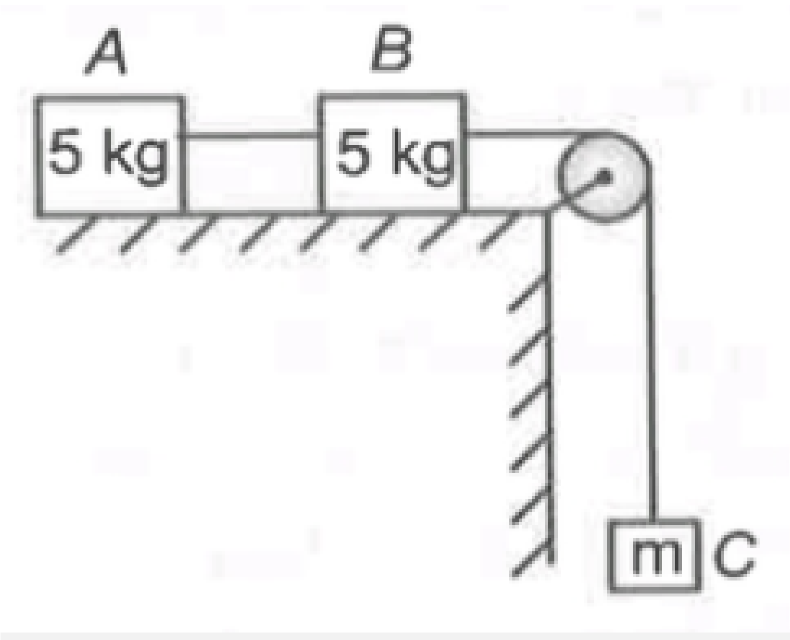
171. Two identical blocks 'A' and 'B' each of mass 5kg are connected with an ideal string and placed on a rough horizontal table having coefficient of friction (mu = 0.4) third block of mass 'm' are connected to block 'B' with another ideal string which is passing over a ideal pully as shown in figure.The minimum value of mass of block 'C' such that blocks just starts moving is (g= 10 m/s^2)



A. 2 kg

B. 1 kg

C. 4 kg

D. 3 kg

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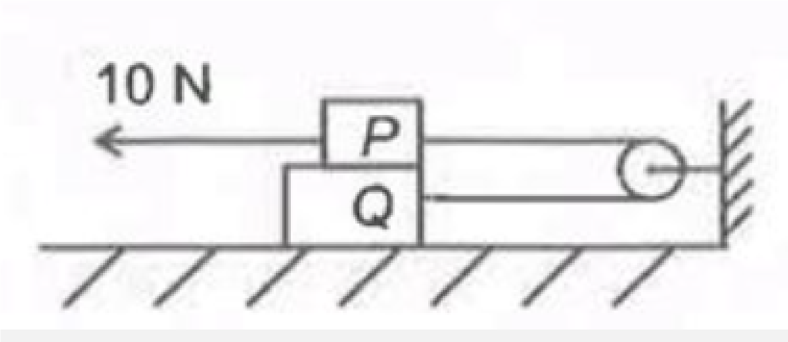
172. A block 'P' of mass 5kg is placed on a block 'Q' of mass 10kg which is placed on a smooth surface and both blocks are connected with a light string which is passing over an ideal pulley as shown as in figure.Force of magnitude 10N is applied on the block and coefficient of friction between the blocks in 0.4.The tension in the string will be



A. 20 N

B. 5 N

C. 15 N

D. 10 N

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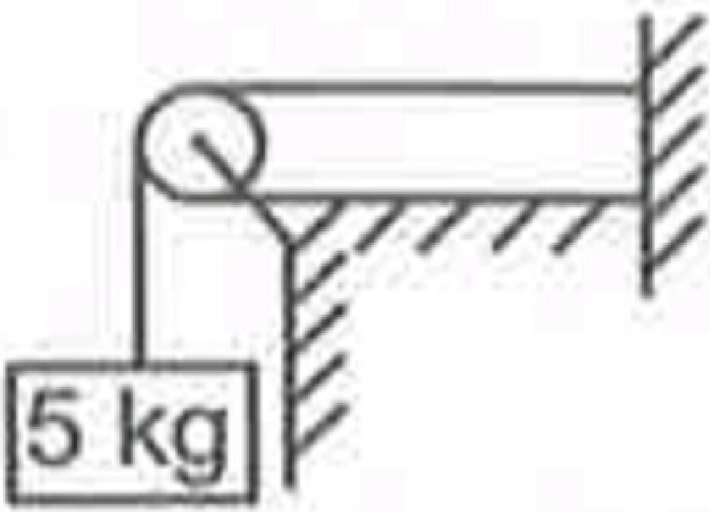
173. A block of mass 5kg is hung with the help of light string which is passing over an ideal pulley as shown as in figure.The force is exerted by the clamp on the pulley will be (g= 10 m/s^2)



A. 50 N

B. 25 N

C. $25\sqrt{2}$ N

D. $50\sqrt{2}$ N

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174. A cricket ball of mass 100g has initial velocity $\overrightarrow{u} = \left(3\hat{i} + 4\hat{j}\right)ms$ and final velocity $\overrightarrow{v} = \left(-3\hat{i} - 4\hat{j}\right)ms$ after being hit by the bat.The magnitude of the impulse on the bat by the ball will be

A. $\frac{1}{2}$ N/s

B. 1 Ns

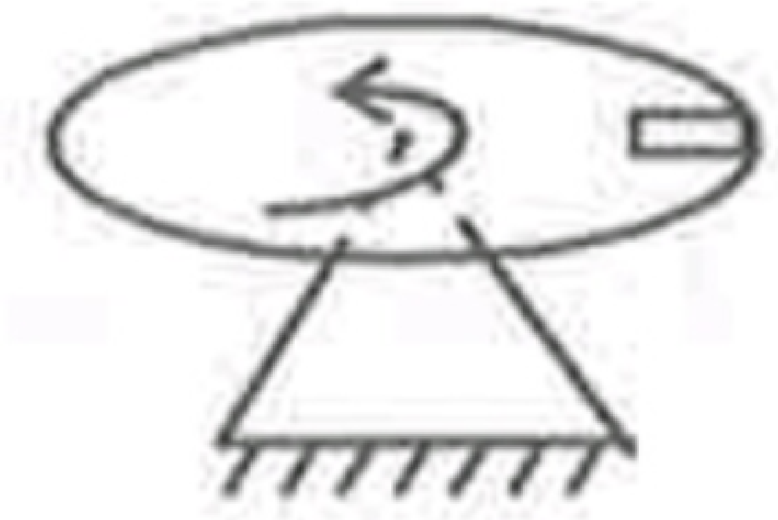
C. 2 Ns

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

Watch Video Solution

175. A block of mass 1kg is placed on the periphery of a rotating rough circular table of radius 50cm as shown in the figure.Angular velocity of the table is 4 rad/s.The minimum value of coefficient of friction between the contact such that there is no relative slipping is

$\left(g = 10\frac{m}{s^2}\right)$



A. 0.8

B. 1.6

C. 0.4

D. 0.2

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176. When a force $\overrightarrow{F} = \left(6\hat{i} - 2\hat{j}\right)$ N displaces a particle by $\overrightarrow{S} = \left(2\hat{i} - 3\hat{j}\right)$ m, then average power is $0.4w$. The time of action of force is

A. $10s$

B. $20s$

C. $45s$

D. $40s$

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177. The velocity of a body of mass m revolving in a vertical circle of radius R at the lowest point $2\sqrt{2}gR$. The minimum tension in the string will be

A. mg

B. Zero

C. 3mg

D. 2mg

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178. A ball P is moving with a certain velocity v, collides head-on with another ball Q of same mass at rest. The coefficient of restitution is 1/4, then ratio of velocity of P and Q just after the collision is

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

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

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

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

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179. In the case of conservative force

A. work done in a closed loop is positive

B. work done in a closed loop is negative

C. work done is independent of the path

D. work done against conservative force

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180. A force $\overrightarrow{F} = \left(2x\hat{i} + 3\hat{j} + 3z^2\hat{k}\right)$ is acting on the particle of mass 2kg which is displaces from point

$A(2, 3, 0)$ to point $B(3, 2, 1)$. the work done by the force on the particle will be

A. $6J$

B. $3J$

C. $4J$

D. $2J$

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181. athe potential energy of a particle of mass $2kg$ moving along the x-axis is given by $U(x) = 4x^2 - 2x^3($

where U is in joules and x is in meters). The kinetic energy of the particle is maximum at

A. $x = 0$

B. $x = 1m$

C. $x = \frac{4}{3}m$

D. $x = 2m$

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182. A block of mass $4kg$ is released from the top of a rough inclines plane of height $10m$. If velocity of the block is$10m/s$ at the bottom of the inclined then work done by the friction force on the block will be

A. $+200J$

B. $+100J$

C. $-200J$

D. $-100J$

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183. A ball stikes a horizontal floor at an angle theta = 30° with normal to the floor . The coefficient of restitution between the ball and floor is. $e=\frac{1}{3}$. The percentage of its kinetic energy lost in the collision is nearly

A. $25\ \%$

B. $50\ \%$

C. $33\ \%$

D. $66\ \%$

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184. A force $\vec{F} = \left(3\hat{i} + 4\hat{j}\right)$ N is acting on a particle. Work done by the force is zero, when particle is moving on the line $2y + Px = 2$, the value of P is

A. $\frac{1}{2}$

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

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

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

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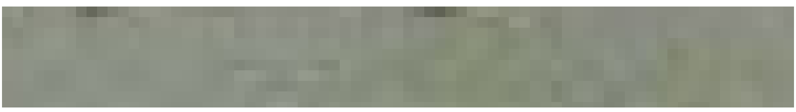
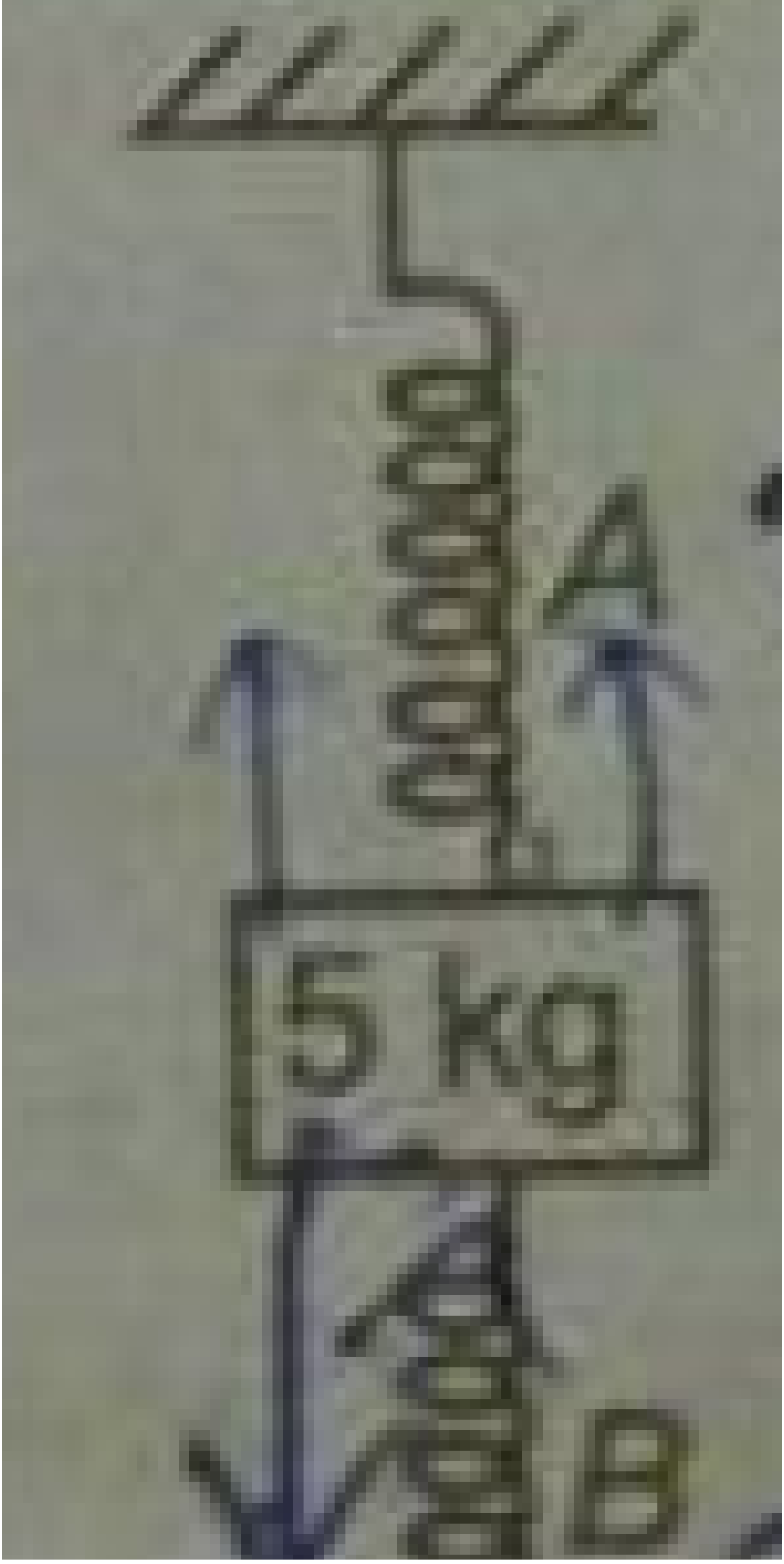
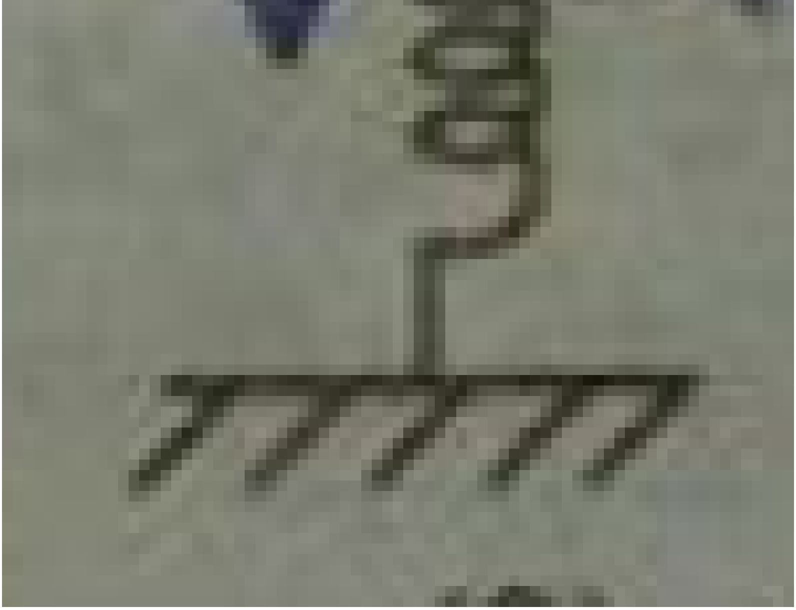
185. A 5 kg block in connected with two spring A and B having force constant, $K_1 = 200\frac{N}{m}$ and $K_2 = 300\frac{N}{m}$ respectively as shown in the figure . The block is released from rest with both the springs in natural length. The maximum energy stored in the spring A will




A
5 kg
A
B

be 

A. $8J$

B. $12J$

C. $4J$

D. $6J$

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186. An electric pump on the ground floor of a building taken 10 minute to fill a tank of $45m^3$ with water. The tank is $20m$ above the water level . If electric power consumed by the pump is $30kW$ then efficiency of the pump will be (density of water is $1000k\frac{g}{m^3}$)

A. $33\ \%$

B. $75\ \%$

C. $50\ \%$

D. $25\ \%$

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187. If two vectors are given as $\overrightarrow{a} = \hat{i} - \hat{j} + 2\hat{k}$ and $\overrightarrow{b} = \hat{i} + 2\hat{j} + \hat{k}$, the unit vector perpendicular to both vec a and vec b is

A. $\dfrac{-5\hat{i} + \hat{j} + 3\hat{k}}{\sqrt{35}}$

B. $\dfrac{5\hat{i} + \hat{j} - 3\hat{k}}{\sqrt{35}}$

C. $\dfrac{3\hat{i} - \hat{j} - 3\hat{k}}{\sqrt{19}}$

D. $\dfrac{-3\hat{i} - \hat{j} + 3\hat{k}}{\sqrt{19}}$

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188. The liner density of a rod of length $2m$ varies as $\lambda = (2 + 3x)$ kg/m, where x is distance from end A .

The distance of a center of mass from the end B will be

A. $1.2m$

B. $0.8m$

C. $1m$

D. $1.6m$

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189. A particle moves in the x-y plane under the action of a force $\overrightarrow{F}$ such that its linear momentum $\overrightarrow{P}$ at any time t is $\overrightarrow{P} = 2\cos t\hat{i} + 2\sin t\hat{j}$. The angle between $\overrightarrow{F}$ and $\overrightarrow{P}$ at a given time t will be

A. $\frac{\pi}{6}$

B. π

C. Zero

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

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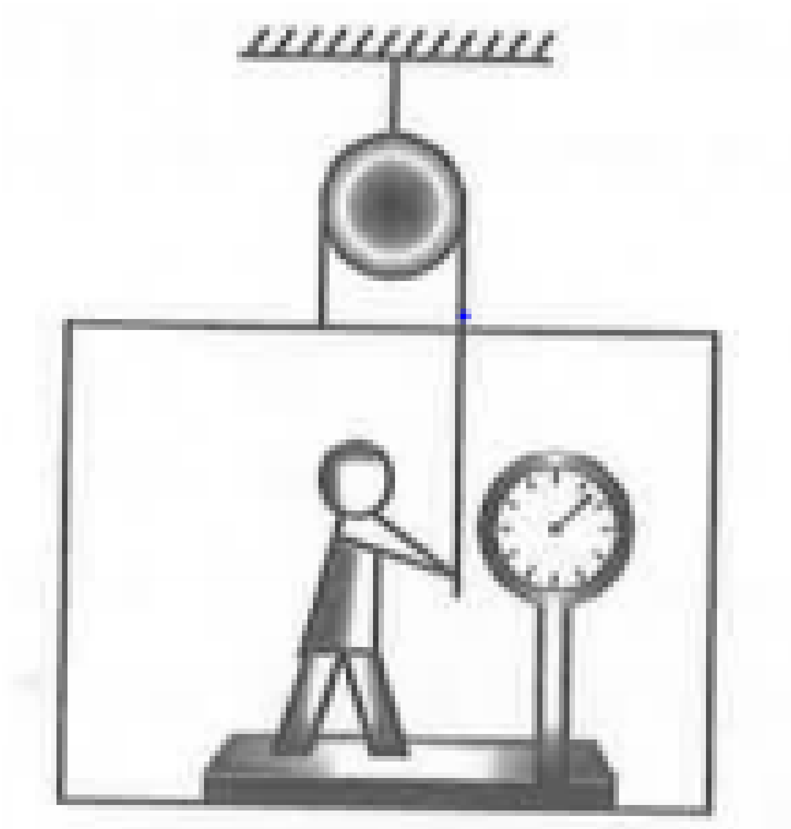
190. In the given diagram, weight of the man is 60 kg and the weight of the machine, box, rope and pulley are neglected. If the man manages to keep the box at rest, then the reading of the machine will be



A. Equal to weight of man

B. More than the weight of man

C. Less than the weight of man

D. Zero

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191. A boy weighing 250 N slides down upto the ground from the top of a slide. The friction offered by the slide is three tenth of his weight. The length and height of the slide is 10 m and 8 m, respectively. The work done by the slide on the boy as he comes down to the ground is

A. −1250 J

B. 2000 J

C. −750 J

D. 750 J

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192. A spring is stretched by distance x and then compressed to same distance from its original length. The work done by the spring force is (k=spring constant)

A. Zero

B. $\frac{1}{2}kx^2$

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

D. $-\frac{1}{2}kx^2$

193. A wheel has a constant angular acceleration of 3rad/s^2. During a 4 s interval, it turns through an angle of 60 rad. If the wheel started from rest, how long has it been in motion before the start of this 4 s interval?

A. 3 s

B. 6 s

C. 9 s

D. 12 s

194. Consider a system of two identical masses. One is dropped from a height and another is thrown from ground with speed u.The acceleration of centre of mass of the system at time t is

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

B. g

C. 2g

D. Zero

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195. A block rests on a rough plane whose inclination θ to the horizontal can be varied. Which of the following graphs indicates how the friction force F between the block and the plane varies as θ is increased?

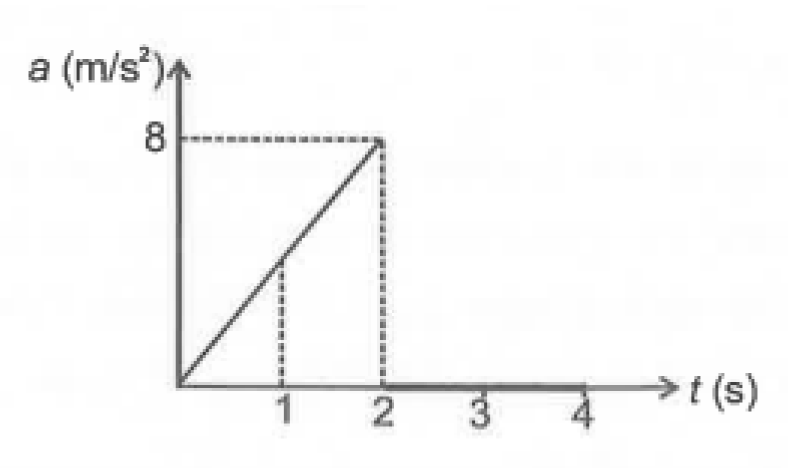
A.

B.

C.

D.

196. A car starts from rest at time t = 0 and it a-t graph is shown in figure. A coin is initially at rest on the floor of the car. At t = 1 s the coin begins to slip and it stops slipping at t = 3 s. The coefficient of static friction between the floor and the coin is (g = 10 m/s^2)



A. A. 0.5

B. B. 0.4

C. C. 0.3

D. D. 0.2

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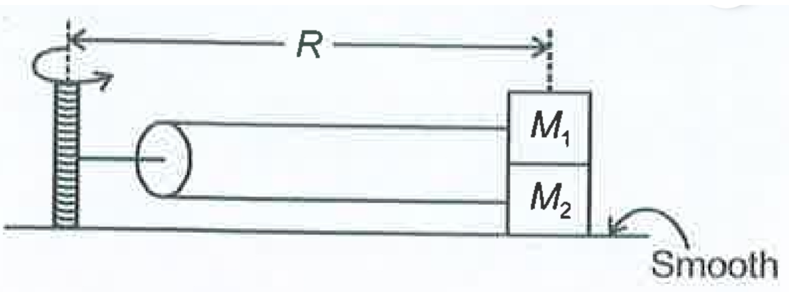
197. In the diagram shown,the coefficient of friction between the blocks is equal to mu.Find out the maximum angular speed with which the system can be rotated so that no slipping takes place?



A. $\sqrt{\frac{2\mu M_1 g}{(M_1 - M_2)R}}$

B. $\sqrt{\frac{2\mu M_1 g}{(M_2 - M_2)R}}$

C. $\sqrt{\frac{2\mu(M_1 + M_2)g}{(M_1 - M_2)R}}$

D. $\sqrt{\frac{2\mu(M_1 + M_2)g}{M_1 R}}$

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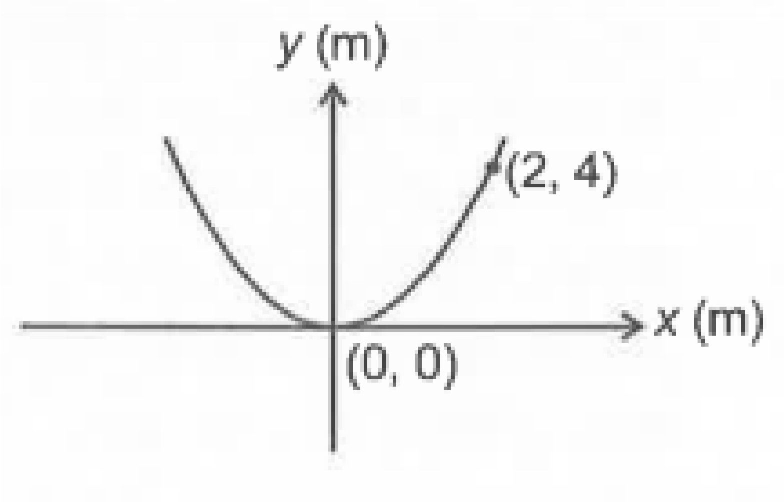
198. A small block of mass 1 kg is at rest on a parabolic surface given by $y = x^2$. The coefficient of friction between the block and the surface is enough to prevent slipping. If position of block on surface is (2 m, 4 m), then the normal force that the surface exerts at this



position is

A. $\frac{g}{2}N$

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

C. N

D. $\frac{g}{\sqrt{17}}N$

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199. A simple pendulum of length L and mass M is oscillating about a vertical line with angular amplitude θ. If for an angular displacement $\phi(\phi > \theta)$ the tension in the string is T_1 and for angular amplitude θ the tension is T_2, then

A. A. $T_1 > T_2$

B. B. $T_1 < T_2$

C. C. $T_1 = T_2$

D. D. $T_1 = \frac{1}{T_2}$

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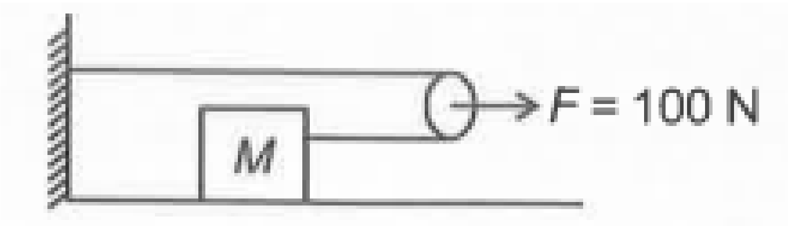
200. A block of mass 20 kg is set into motion on a frictionless horizontal surface with the help of massless smooth pulley and rope as shown in the figure. Find the acceleration of the pulley



A. 5 m/s^2

B. 1.25 m/s^2

C. 1.5 m/s^2

D. 1 m/s^2

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201. In a simple Atwood's machine, two unequal masses $m_1 = 5kg$, $m_2 = 2kg$ are connected by a string going over a clamped light smooth pulley. Now a constant force F = 1 N is applied on each mass in vertically downward direction. The ratio of acceleration of either block before and after applying the force will be

A. $\frac{7}{17}$

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

C. 1

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

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202. A car goes on a horizontal circular road of radius R. The speed of car is increasing at constant rate a m/s^2. If the friction coefficient between the road and the tyre is μ, then the limiting speed of car is

A. A. $\left[\left(\mu^2 g^2 - a^2\right) R^2\right]^{\frac{1}{4}}$

B. B. $\left[\left(\mu^2 g^2 + a^2\right) R^2\right]^{\frac{1}{4}}$

C. C. $\sqrt{\mu g R}$

D. D. $\sqrt{aR}$

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203. A 1 kg particle strikes a wall with velocity 1 m/s at an angle of 60^o with the wall and reflects at the same angle. If it remains in contact with the wall for 0.1 s, then the force is

A. Zero

B. $40\sqrt{3}N$

C. $10\sqrt{3}N$

D. $5\sqrt{3}N$

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204. A block of mass m is kept over another block of mass 2 m and the system rests on a smooth horizontal surface. The coefficient of friction between the blocks is 0.50. Find the work done by the force of friction on the smaller block by the bigger block during a displacement d of the system, when a force mg is applied to the lower block.

A. $mg\frac{d}{3}$

B. mgd

C. $mg\frac{d}{2}$

D. Zero

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205. A particle moves from a point $(2m, 3m, 0)$ to $(3m, 2m, 0)$ under the action of force of magnitude 5N acting along the line $y = x$. The work done by the force on the particle during the displacement is

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

B. $5\sqrt{2}J$

C. 5 J

D. Zero

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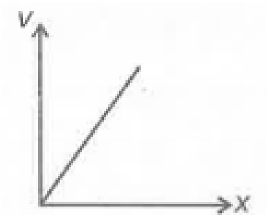
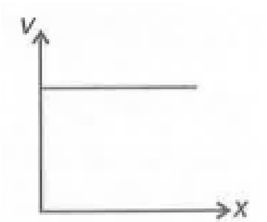
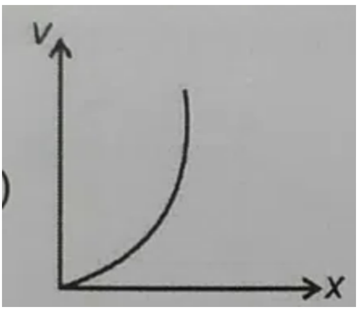
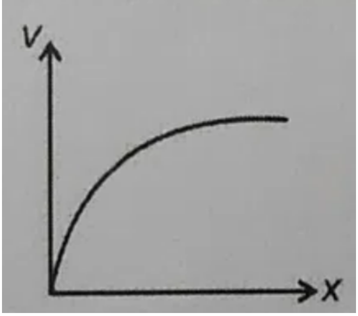
206. When a constant power is delivered to an object, then the graph between velocity and position of the object is (motion of object is along x-axis)

A. 

B. 

C. 

D. 

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207. A bullet moving with a speed of 100 m/s can just penetrate two planks of equal thickness. Now if the speed is doubled, then the number of such planks required to stop the bullet will be

A. A. 8

B. B. 10

C. C. 6

D. D. 5

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208. A small block of mass m is kept on a rough inclined surface of inclination θ fixed in an elevator. The elevator goes up with a uniform velocity v and the block does not slide on the wedge. The work done by the force of friction on the block in time t will be

A. $-mgvt\sin\theta$

B. $-\frac{mgvt\sin 2\theta}{2}$

C. $-mgvt\cos\theta$

D. $-\frac{mgvt\cos 2\theta}{2}$

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209. A particle is rotated in a verticle circle by connecting it to the end of massless rod of length l and keeping the other end of rod fixed. The minimum speed of the particle when the rod is horizontal for which the particle will complete the circle is

A. $\sqrt{3gl}$

B. $\sqrt{2gl}$

C. $\sqrt{gl}$

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

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210. A point on a body performing pure rotation is 10cm from the axis oof rotation of body. Angular position of the point from reference line is given by $0 = 0.5e^{2t}$, where 0 is in radian and t in second. The acceleration of the point at t =0 is

A. $\frac{\sqrt{5}}{10}m/s^2$

B. $\sqrt{5}m/s^2$

C. $\frac{1}{10}m/s^2$

D. 1/20 m//s^2

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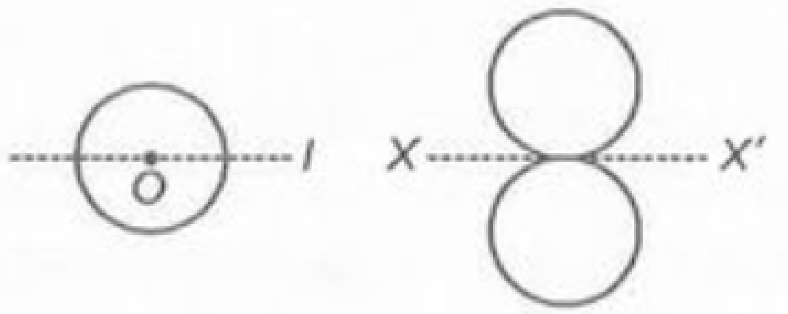
211. Moment of inertia of a ring about its diametric axis is I. Two such rings are welded as shown in figure. The new moment of intertia about XX' ais is



A. 6I

B. 3l

C. 2l

D. l/2

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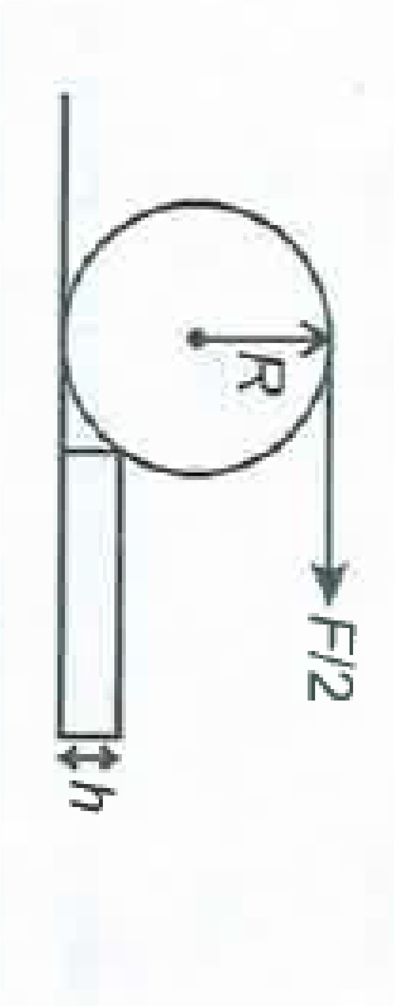
212. A cylinder of mass M and radius R is to be raised on a horizontal step of height $h = \frac{R}{3}$. Cylinder is pulled by a rope as shown in figure. Assuming no slipping, the minimum value of force F to raise the cylinder is



A. $\dfrac{2}{\sqrt{7}}Mg$

B. $\dfrac{2}{\sqrt{5}}Mg$

C. $\dfrac{2}{\sqrt{3}}Mg$

D. Mg

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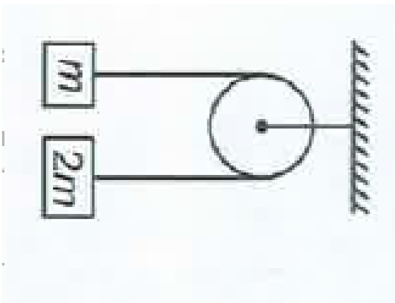
213. two masses $2m$ and m are attached to the the ends of a string while passing over a smooth Pulley of mass m and radius R. The ratio of tensions in both the strings is



A. $1:1$

B. $10 : 9$

C. $5 : 4$

D. $3 : 2$

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214. Which of following statement is correct ? .

A. The normal reaction and gravitational force on a body placed on a surface are action-reaction

B. The direction of friction frce on a body placed on a rough surface always opposite to applied force

C. The normal force on a body placed on a rough surface is always equal to weight of the body

D. A body, in motion, may not be acted upon by a force

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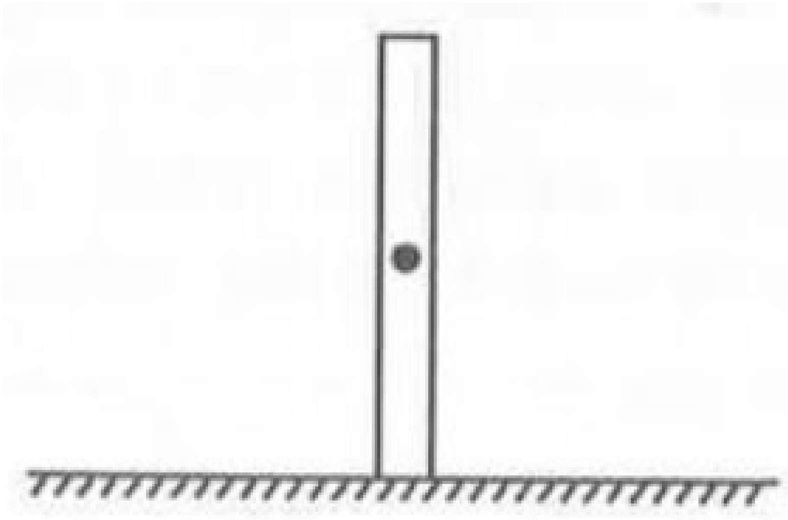
215. A thin rod of mass M and length L is released from rest in position shown. The path of centre of mass of rod till the rod become horizontal is [Assume surface is smooth]



A. Circular

B. Straight line

C. Parabola

D. Eliptical

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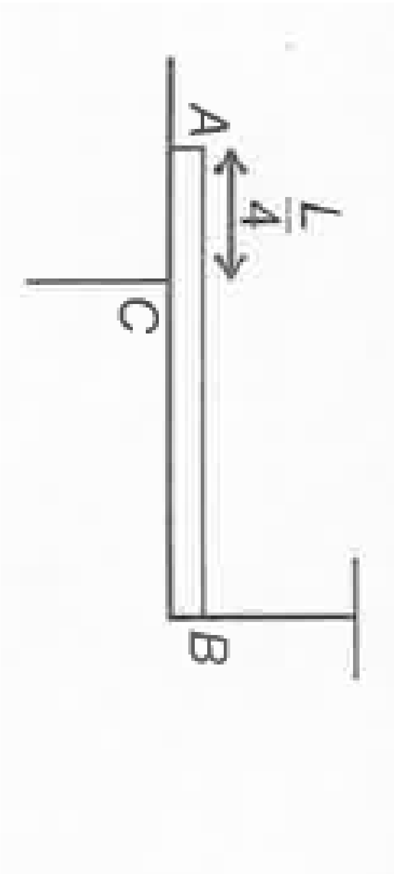
216. A uniform rod of mass m and length L is kept on a horizontal table with $\frac{L}{4}$ length on the table as shown in figure. As the string attached to the end B is cut, the angular acceleration of the rod about point C will be



A. $3\frac{g}{7}L$

B. $12\frac{g}{7}L$

C. $4\frac{g}{5}L$

D. $9\frac{g}{7}L$

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217. A particle is projected with initaial velocity u at an angle 0 with horizontal, then variation of angular momentum L about starting w.r.t. Time t will be

A.

B.

C.

D.

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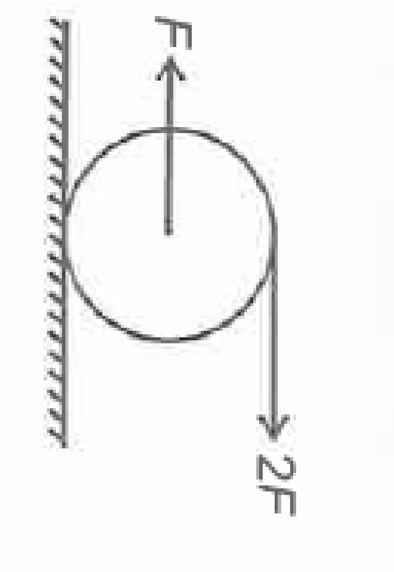
218. A solid sphere of mass m and radius R is on a rough surface as shown in figure two forces have you magnitude to F and F are applied as shown if there is performed pure rolling along right right then frictional force acting on the sphere is



A. In forward direction

B. In backward direction

C. Zero

D. Can't be predicted

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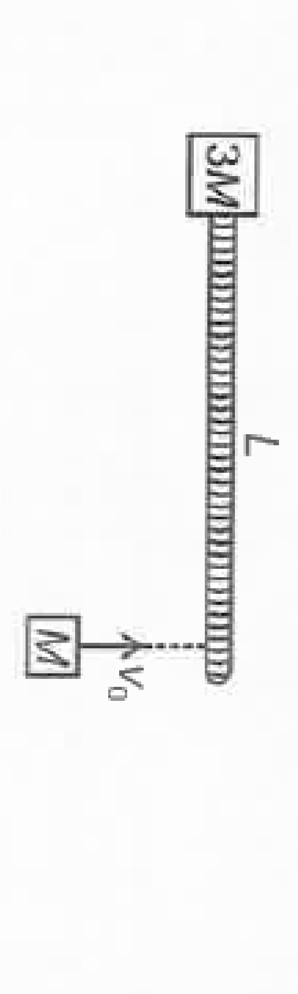
219. A block of mass $3M$ connected to a massless rod of length L lies at rest on a fixed frictionless table. A second block of mass M moving with speed v_0 strikes the opposite end of the rod at right angle and sticks. The velocity of centre of mass of the system after collision is



A. $\frac{V_0}{4}$

B. $\frac{V_0}{3}$

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

D. V_0

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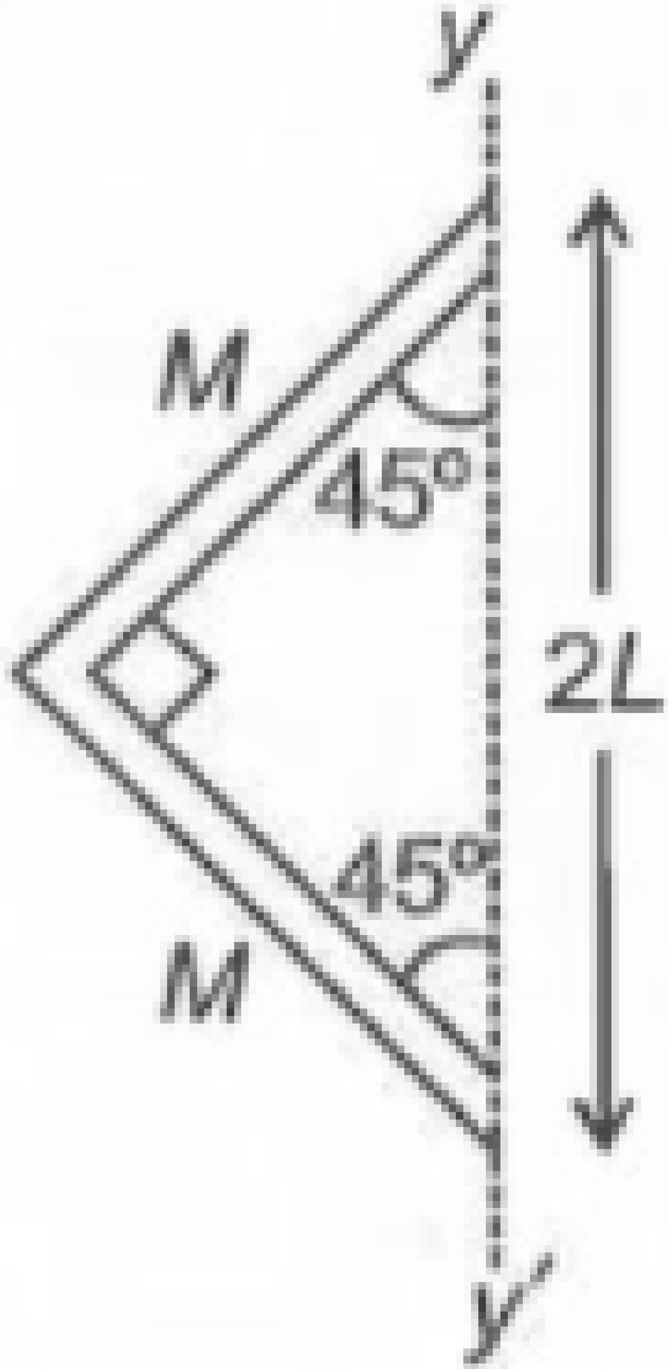
220. For the structure shown in figure, moment of inertia about an axis passing through yy' is



y
M
45°
2L
45°
M
y′

A. $\frac{2ML^2}{3}$

B. $\frac{ML^2}{3}$

C. $\frac{8ML^2}{3}$

D. $\frac{4ML^2}{3}$

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221. When a sphere rolls down an inclined plane, then identify the correct statement related to the work done by friction force.

A. The friction force does positive translational work

B. The friction force does negative rotational work

C. The net work done by friction is zero

D. Positive, negative or zero depends on inclination of plane

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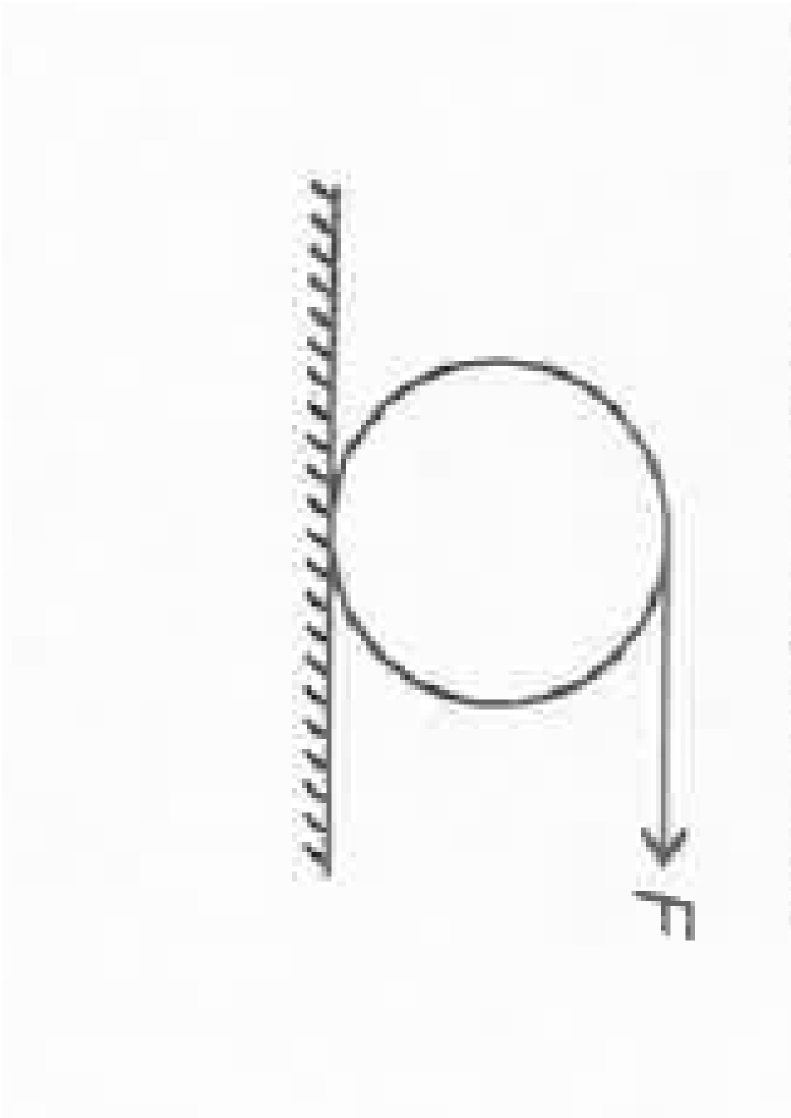
222. A force $(F = Mg)$ is applied on the top of a circular ring of mass M and radius R kept on a rough horizontal surface. If the ring rolls without slipping, then minimum coefficient of friction required is



A. Zero

B. 0.4

C. 0.8

D. 0.2

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223. A solid sphere of mass m rolls without slipping on an inlined plane of inclination 0. what shoul be the minimum coefficient of static feiction to support pure rolling?

A. A. $\frac{2}{5}\tan 0$

B. B. $\frac{2}{3}\tan 0$

C. C. $\frac{2}{7}\tan 0$

D. D. $\frac{1}{7}\tan 0$

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224. A solid sphere is thrown on a horizontal rough surface with initial velocity of centre of mass V_0 without rolling. Velocity of its centre of mass when its starts pure rolling is

A. A. $\frac{2_{V0}}{7}$

B. B. $\frac{2_{V0}}{5}$

C. C. $\frac{5_{V0}}{3}$

D. D. $\frac{5_{V0}}{7}$

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225. A particle is rotating about a fixed axis with angular acceleration $\overrightarrow{\alpha} = \left(3\hat{i} + \hat{j} + \hat{k}\right) \quad rad / s^2$. The tangential acceleration of a point having radius vectorn $\left(2\hat{i} - \hat{j} - \hat{k}\right)$m from axis of rotation is (in $\frac{m}{s^2}$)

A. $5\hat{j} - 5\hat{k}$

B. $5\hat{i} - 5\hat{k}$

C. $3\hat{j} - 5\hat{k}$

D. $2\hat{i} - 5\hat{k}$

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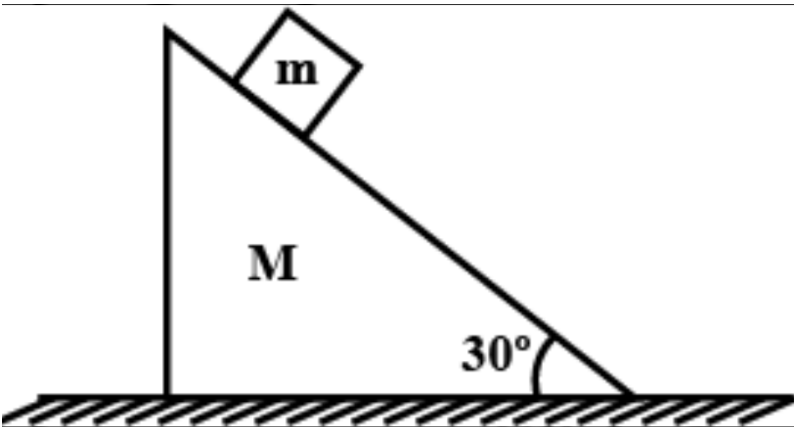
226. A block of mass m is placed on the top of bigger wedge M. All the surfaces are frictionless. The system is released from rest. Find the distance moved by smaller block (w.r.t. triangular wedge) when bigger wedge travel distance X on plane surface



A. $\dfrac{2(m+M)X}{\sqrt{3}m}$

B. $\dfrac{(m+M)X}{\sqrt{3}m}$

C. $\frac{(m+M)X}{m}$)

D. $\frac{mX}{m+M}$

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227. A small particle of mass m is projected at an angle 0 with the x- axis, with initial velocity V_0 in the x - y plane. Just before time $\frac{2V_0 \sin 0}{g}$,the angular momentum of the particle about the point of projection is 

A. $\frac{2mv_0^3 \sin 0. \cos^2 0}{g}$

B. $\frac{2mv_0^3 \sin^{20}. \cos 0}{g}$

C. $\frac{mv_0^3 \sin 0. \cos 0}{g}$

D. $\frac{2mv_0^3 \sin^{20}. \cos^2 0}{g}$

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228. Linear mass density of a rod AB (of length 10 m) varied with distance x from its end A as $\lambda = \lambda_0 x^3$ (λ_0 is poitive constant). Distance of centre of mass the rod, form end B is

A. 8 m

B. 2 m

C. 6 m

D. 4 m

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229. A bomb is projected obliquely upward. It explodes at its highest point such that the pieces fly off with same speed in different directions in same vertical plane. Consider motion of the pieces of the bomb before they strike the ground

A. Centre of mass of the system of pieces of the bomb follows straight path

B. centre of mass of the system of pieces of the bomb follows the same parabolic path

C. All the pieces lie on a circle at any instant

D. All the pieces lie on a parabola at any instant

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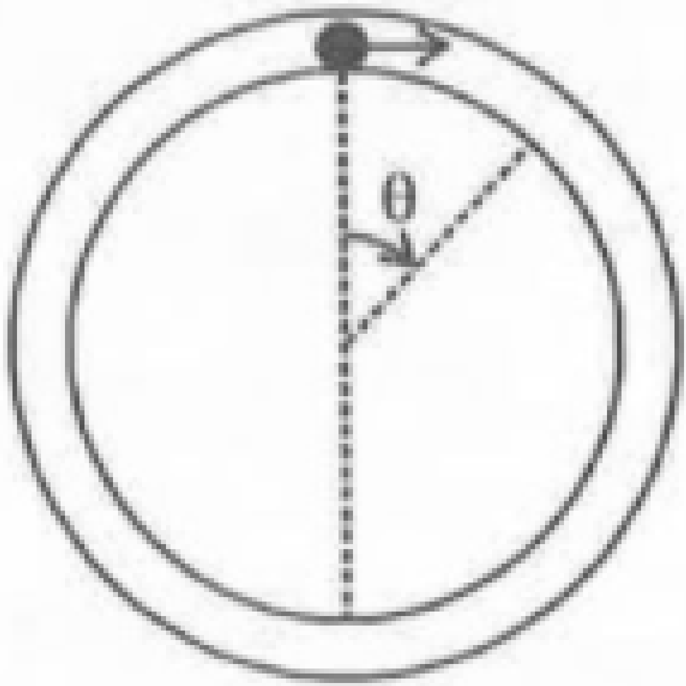
230. A ball is released from top of the smooth vertical, when i just leaves the contract form inner surface of the



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A. $\cos\theta = \frac{1}{3}$

B. $\cos\theta = \frac{1}{4}$

C. $\tan\theta = \frac{\sqrt{5}}{2}$

D. $\tan\theta = \frac{1}{\sqrt{2}}$

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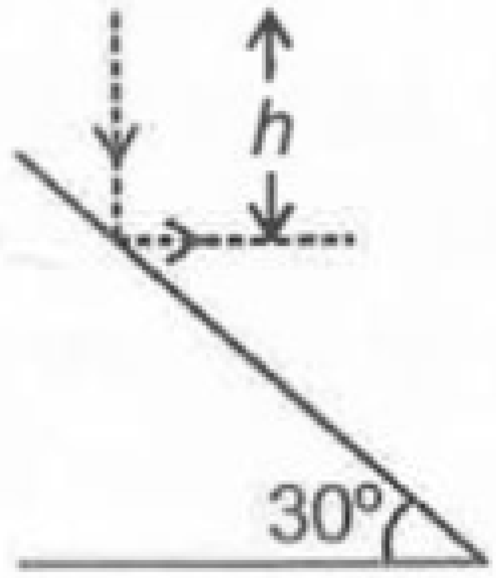
231. A ball falls from height h over an inclined plane of inclination 30° as shown. After the collision, the ball moves horizontally, the coefficient of restitution is



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

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

C. 1

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

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232. Select the correct option regarding collision.

A. In elastic collision total kinetic energy of system before, during and after is same

B. For collision, physical bodies is necessary

C. Coefficient of restitution for a collision cannot be negative

D. All of these

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233. Select the correct option regarding collision.

A. In elastic collision total kinetic energy of system before, during and after is same

B. For collision, physical contact between the colloiding bodies is necessary

C. coefficient of restitution for a collision cannot be negative

D. All of these

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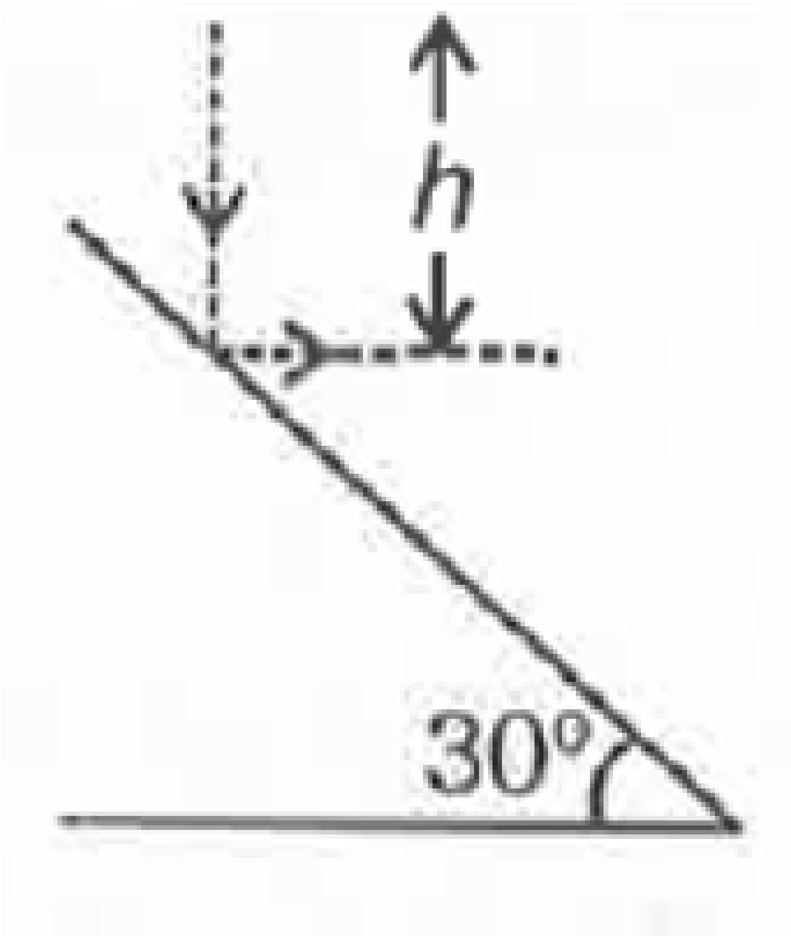
234. A ball falls from height h over an inclined plane of inclination $30^{\circ} C$ as shown. After the collision, the ball moves horizontally, the coefficient of restitution is



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

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

C. 1

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

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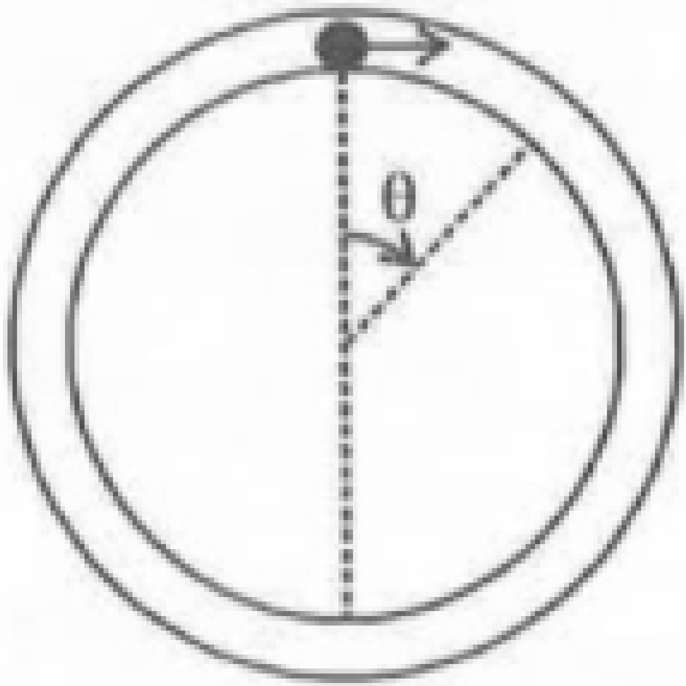
235. A ball is released from top of the smooth vertical, when i just leaves the contract form inner surface of the



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A. $\cos\theta = \frac{1}{3}$

B. $\cos\theta = \frac{1}{4}$

C. $\tan\theta = \frac{\sqrt{5}}{2}$

D. $\tan\theta = \frac{1}{\sqrt{}}2$

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236. A bomb is projected obliquely upward. It explodes at its highest point such that the pieces fly off with same speed in different directions in same vertical plane. Consider motion of the pieces of the bomb before they strike the ground

A. centre of mass of the system of pieces of the bomb follows straight path

B. centre of mass of the system of pieces of the bomb follows the same parabolic path

C. All the pieces lie on a circle at any instant

D. All the pieces lie on a parabola at any instant

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237. Linear mass density of a rod $AB(of \leq n > h10m)$ varies with distance x from its end A as λ =$\lambda_0 x^3$ (λ_0 is positive constant) . Distance of centre of mass of the rod , from end B is

A. $8m$

B. $2m$

C. $6m$

D. $4m$

238. A small particle of mass m is projected at an angle 0 with the x- axis, with initial velocity V_0 in the x - y plane. Just before time $\frac{2V_0 \sin 0}{g}$,the angular momentum of the particle about the point of projection is

A. $\frac{2m(v_0)^3 \sin\theta. (\cos\theta)^2}{g}$

B. $\frac{2m(v_0)^3 (\sin\theta)^2. \cos\theta}{g}$

C. $\frac{m(v_0)^3 \sin\theta. \cos\theta}{g}$

D. $\frac{2m(v_0)^3 (\sin\theta)^2. (\cos\theta)^2}{g}$

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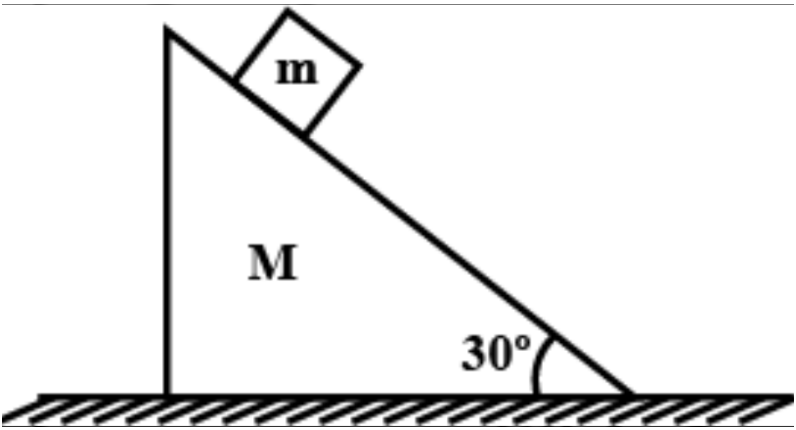
239. A block of mass m is placed on the top of bigger wedge M. All the surfaces are frictionless. The system is released from rest. Find the distance moved by smaller block (w.r.t. triangular wedge) when bigger wedge travel distance X on plane surface



A. $\dfrac{2(m+M)X}{\sqrt{3}m}$

B. $\dfrac{(m+M)X}{\sqrt{3m}}$

C. $\dfrac{(m+M)X}{m}$

D. $\dfrac{mx}{m+M}$

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240. A sphere of mass M rolls without slipping on the inclined plane of inclination θ. What should be the minimum coefficient of friction, so that the sphere rolls down without slipping?

A. $\dfrac{2}{5}\tan\theta$

B. $\dfrac{2}{3}\tan\theta$

C. $\frac{2}{7}\tan\theta$

D. $\frac{1}{7}\tan\theta$

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241. A force $(F = Mg)$ is applied on the top of a circular ring of mass M and radius R kept on a rough horizontal surface. If the ring rolls without slipping, then minimum coefficient of friction required is

A. zero

B. 0.4

C. 0.8

D. 0.2

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242. When a sphere rolls down an inclined plane, then identify the correct statement related to the work done by friction force.

A. the friction force does positive translational work

B. the friction force does negative rotational work

C. the net work done by friction is zero

D. positive, negative or zero depends on inclination of plane

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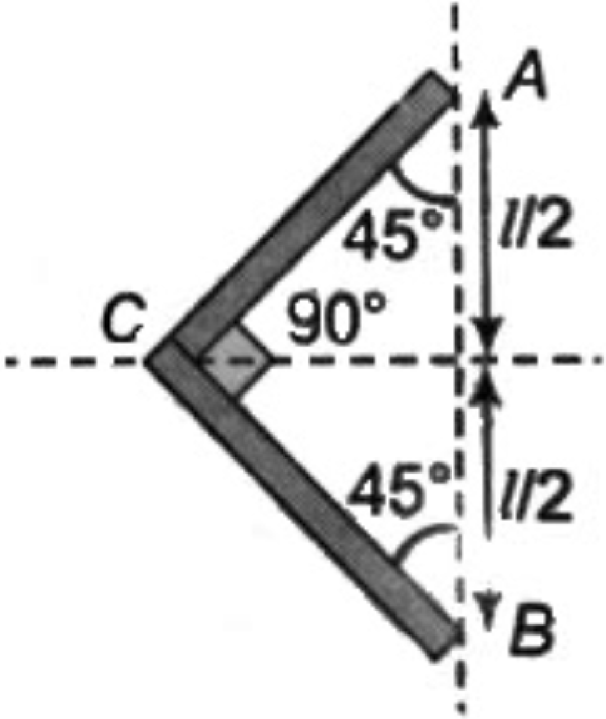
243. For the structure shown in figure, moment of inertia about an Axis passing through yy' is



A. $\frac{2ML^2}{2}$

B. $\frac{ML^2}{2}$

C. $\frac{8ML^2}{2}$

D. $\frac{4ML^2}{2}$

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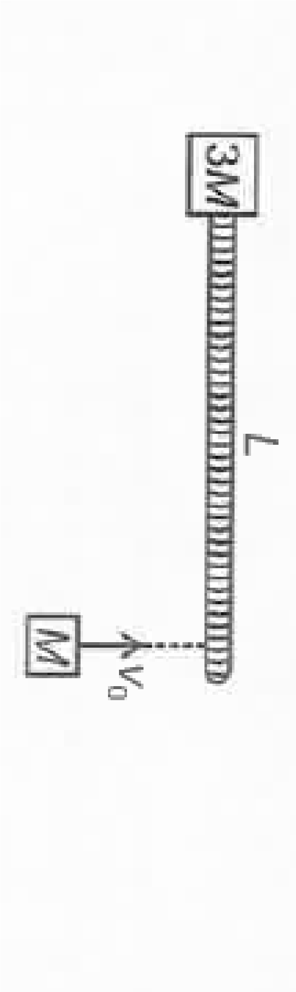
244. A block of mass $3M$ connected to a massless rod of length L lies at rest on a fixed frictionless table. A second block of mass M moving with speed v_0 strikes the opposite end of the rod at right angle and sticks. The velocity of centre of mass of the system after collision is



A. $\frac{v_0}{4}$

B. $\frac{v_0}{3}$

C. $\frac{v_0}{2}$

D. v_0

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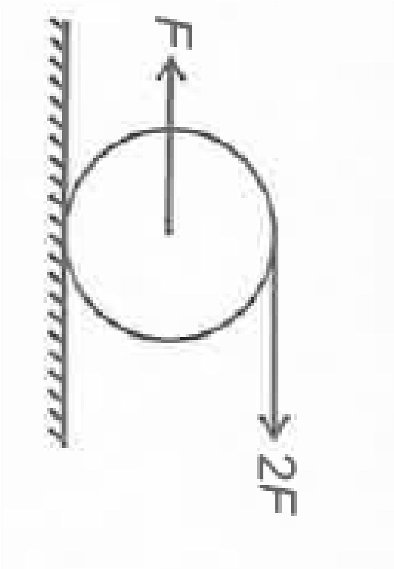
245. A solid sphere of mass m and radius R is on a rough surface as shown in figure two forces have you magnitude to F and F are applied as shown if there is performed pure rolling along right right then frictional force acting on the sphere is



A. in forward direction

B. in backward direction

C. zero

D. can't be predicted

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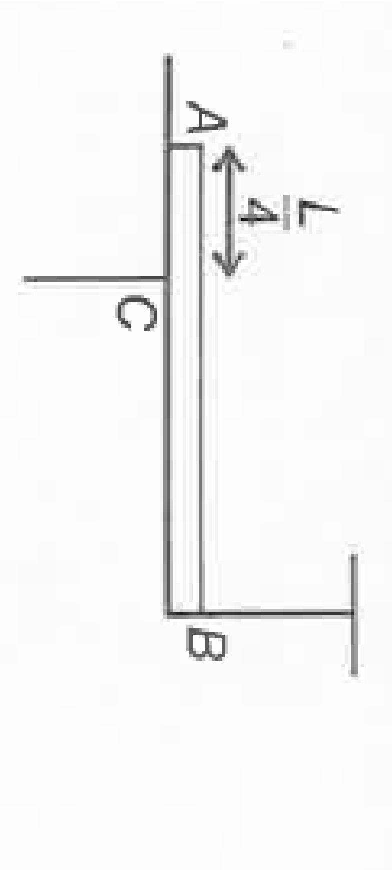
246. A uniform rod of mass m and length L is kept on a horizontal table with $\frac{L}{4}$ length on the table as shown in figure. As the string attached to the end B is cut, the angular acceleration of the rod about point C will be



A. $\frac{3g}{7L}$

B. $\frac{12g}{7L}$

C. $\frac{4g}{5L}$

D. $\frac{9g}{7L}$

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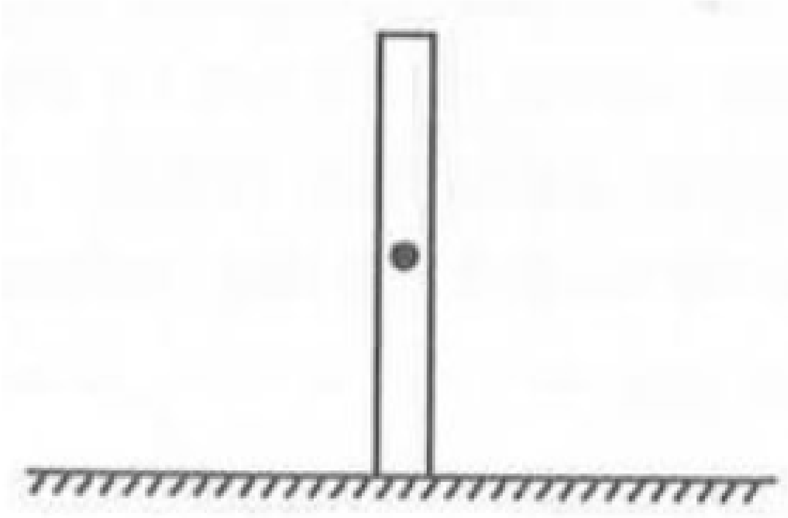
247. A thin rod of mass M and length L is released from rest in position shown. The path of centre of mass of rod till the rod become horizontal is [Assume surface is smooth] 

A. Circular

B. Straight line

C. Parabola

D. Elliptical

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248. which of the following statement is correct?

A. the normal reaction and gravitational force on a body placed on a surface are action-reaction

B. the direction of friction force on a body placed on a rough surface is always opposite to applied force

C. the normal force on a body placed on a rough surface is always equal to weight of the body

D. a body, in motion, may not be acted upon by a force

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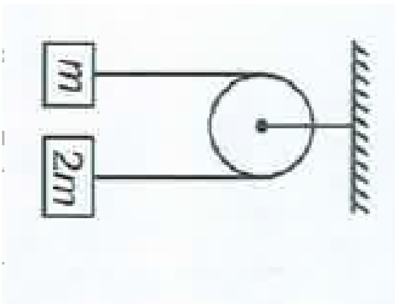
249. two masses $2m$ and m are attached to the the ends of a string while passing over a smooth Pulley of mass m and radius R. The ratio of tensions in both the strings is



A. $1:1$

B. $10:9$

C. $5:4$

D. $3:2$

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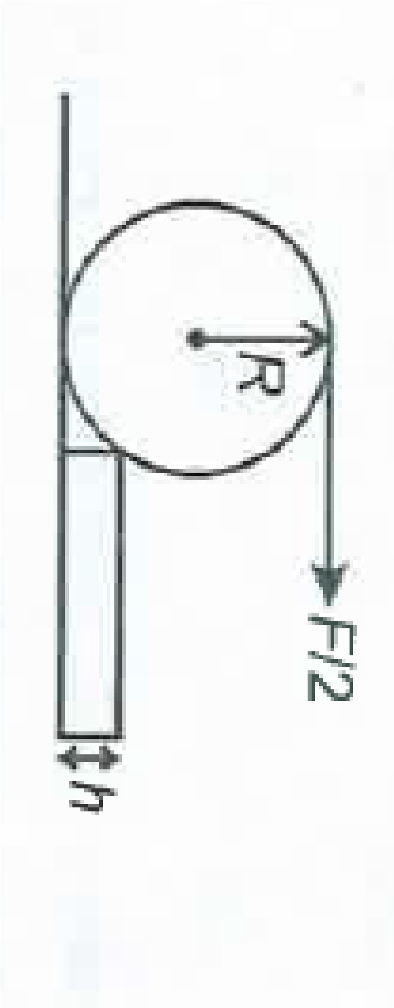
250. A cylinder of mass M and radius R is to be raised on a horizontal step of height $h = \frac{R}{3}$. Cylinder is pulled by a rope as shown in figure. Assuming no slipping, the minimum value of force F to raise the cylinder is



A. $\frac{2}{\sqrt{7}}(Mg)$

B. $\frac{2}{\sqrt{5}}(Mg)$

C. $\frac{2}{\sqrt{3}}(Mg)$

D. Mg

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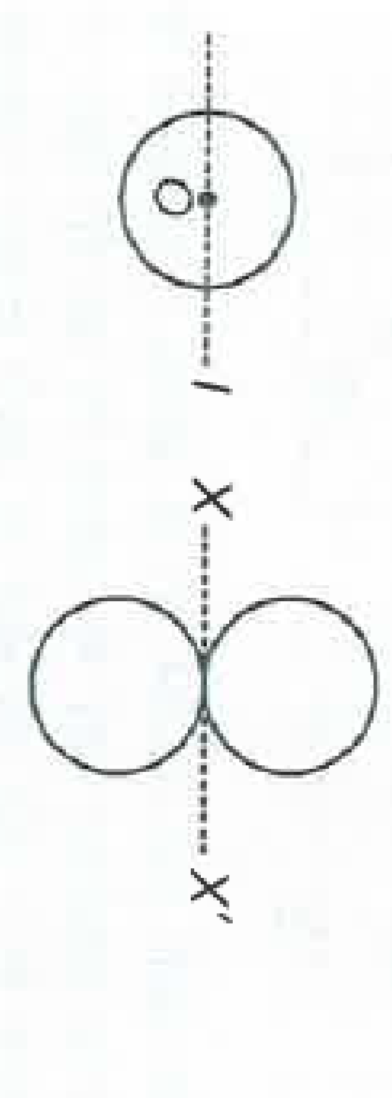
251. Moment of inertia of a ring about its diameteric axis is I. Two such rings are welded as shown in figure.

The new moment of inertia about XX' axis is



A. 6I

B. $3I$

C. 2I

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

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252. A point on a body performing pure rotation is 10cm from the axis oof rotation of body. Angular position of the point from reference line is given by $0 = 0.5e^{2t}$, where 0 is in radian and t in second. The acceleration of the point at t =0 is

A. sqrt5/10 $\frac{m}{s^2}$

B. sqrt5 $\frac{m}{s^2}$

C. 1/10 $\frac{m}{s^2}$

D. 1/20 $\frac{m}{s^2}$

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253. A particle is rotated in a verticle circle by connecting it to the end of massless rod of length l and keeping the other end of rod fixed. The minimum speed of the particle when the rod is horizontal for which the particle will complete the circle is

A. sqrt(3gl)

B. sqrt(2gl)

C. sqrt(gl)

D. √(gl /2)

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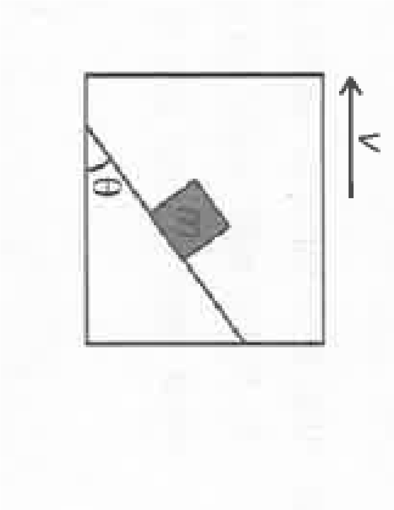
254. A small block of mass m is kept on a rough inclined surface of inclination θ fixed in a car. The car moves with a uniform velocity v and the block does not slide on the wedge. The work done by the force of friction on the block in time t will be



A. $-mgvt\sin\theta$

B. $\dfrac{-mgvt\sin 2\theta}{2}$

C. $-mgvt\cos\theta$

D. $\dfrac{-mgvt\cos 2\theta}{2}$

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255. A bullet moving with a speed of $100ms^{-1}$ can just penetrate two plants of equal thickness. Then, the number of such planks penerated by the same bullet when the speed is doubled will be

A. 8

B. 10

C. 6

D. 5

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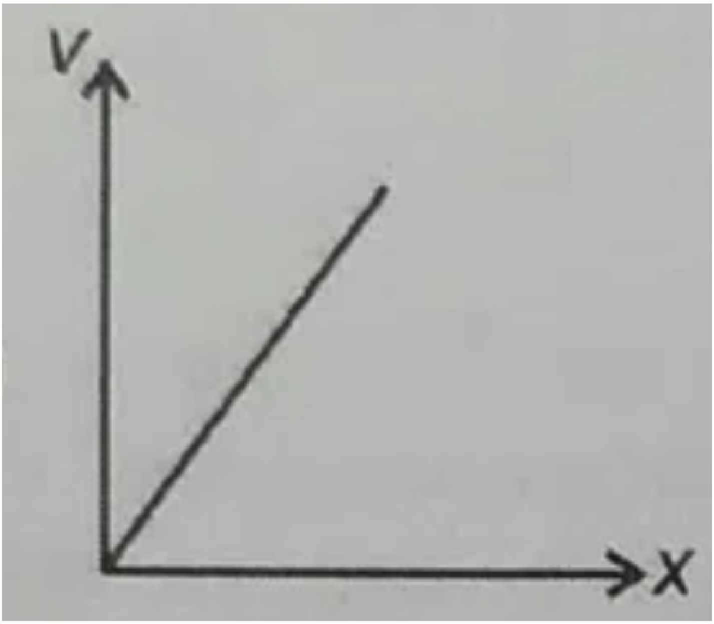
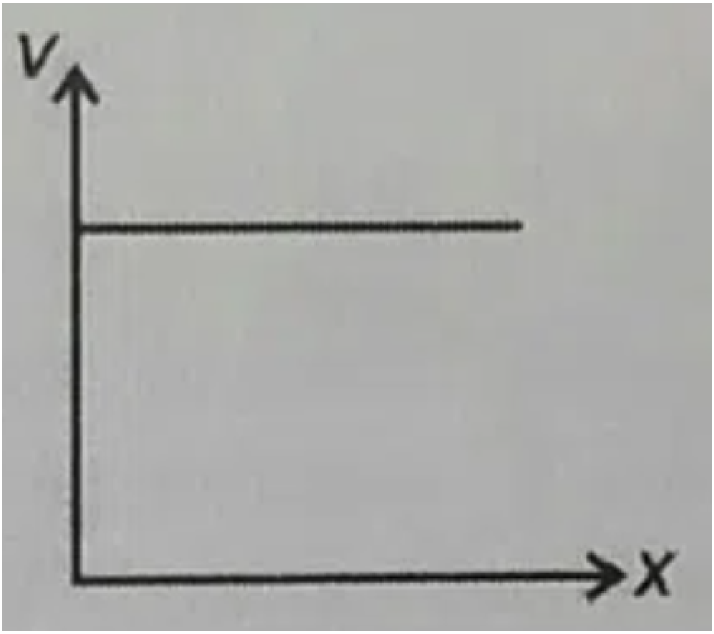
256. when a constant power is delivered to an object, then the graph between velocity and position of the object is(motion of object is along x-axis)

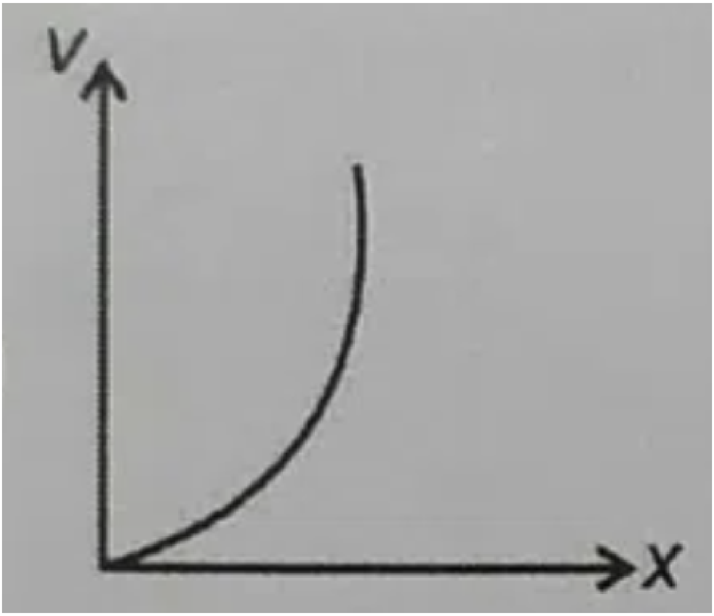
A.



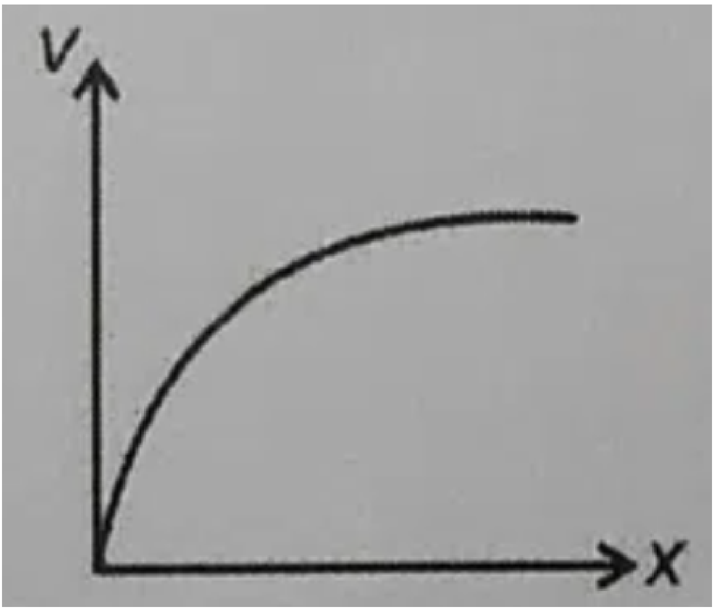
B.



C.



D.



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257. A particle moves from a point $(2m, 3m, 0)$ to $(3m, 2m, 0)$ under the action of force of magnitude 5N acting along the line $y = x$. The work done by the force on the particle during the displacement is

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

B. $5\sqrt{2}$ J

C. 5 J

D. zero

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258. A block of mass m is kept over another block of mass 2 m and the system rests on a smooth horizontal surface. The coefficient of friction between the blocks is 0.50. Find the work done by the force of friction on the smaller block by the bigger block during a displacement d of the system, when a force mg is applied to the lower block.

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

B. mgd

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

D. zero

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259. A car goes on a horizontal circular road of radius R, the speed increasing at a constant rate $\frac{dv}{dt} = a$. The friction coefficient between the road and the tyre is μ. Find the speed at which the car will skid.

A. $\left[\left(\mu^2 g^2 - a^2\right) R^2\right]^{\frac{1}{4}}$

B. $\left[\left(\mu^2 g^2 + a^2\right) R^2\right]^{\frac{1}{4}}$

C. $\sqrt{\mu g R}$

D. $\sqrt{aR}$

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260. In a simple Atwood's machine, two unequal masses $m_1 = 5kg$, $m_2 = 2kg$ are connected by a string going over a clamped light smooth pulley. Now a constant force F = 1 N is applied on each mass in vertically downward direction. The ratio of acceleration of either block before and after applying the force will be

A. 44394

B. 44318

C. 1

D. 44289

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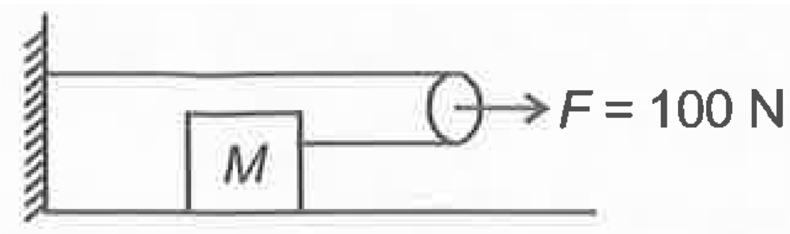
261. A block of mass of $20kg$ is set into motion on a frictionless horizontal surface with the help of massless smooth pulley and rope as shown in figure.Find the acceleration of the pulley



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A. $5\frac{m}{s^2}$

B. $1.25\frac{m}{s^2}$

C. $1.5\frac{m}{s^2}$

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

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262. A simple pendulum of length L and mass (bob) M is oscillating in a plane about a vertical line between angular lime $-\phi$ and $+\phi$. For an angular displacement $\theta(|\theta| < \phi)$, the tension in the string and the velocity of the bob are T and V, respectively. The following relations hold good under the above conditions:

A. $T_1 > T_2$

B. $T_1 < T_2$

C. $T_1 = T_2$

D. $T_1 = \left(\frac{1}{T_2}\right)$

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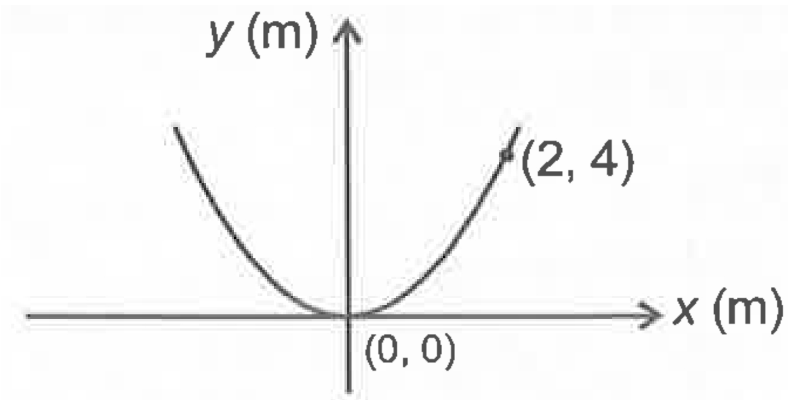
263. A small block of mass $1kg$ is at rest on a parabolic surface given by $y = x^2$. The coefficient of friction between the block and the surface is enough to prevent slipping.If position of block on surface is(2m, 4m) then the normal force then the surface exerts at this position is



A. $\frac{g}{2}N$

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

C. N

D. $\frac{g}{\sqrt{17}}N$

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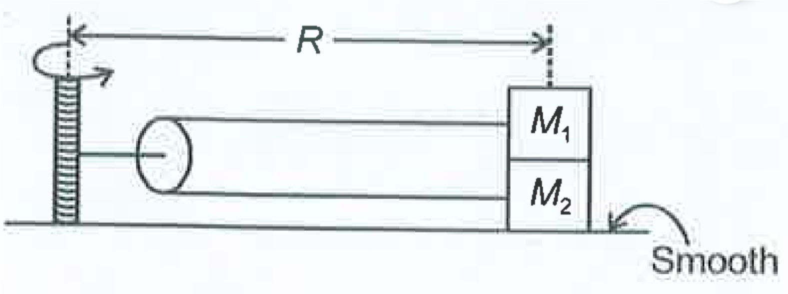
264. In the diagram shown,the coefficient of friction between the blocks is equal to mu.Find out the maximum angular speed with which the system can be rotated so that no slipping takes place?



A. $\sqrt{\dfrac{2\mu M_1 g}{(M_1 - M_2)R}}$

B. $\sqrt{\dfrac{2\mu M_2 g}{(M_1 - M_2)R}}$

C. $\sqrt{\dfrac{2\mu (M_1 + M_2) g}{(M_1 - M_2)R}}$

D. $\sqrt{\dfrac{2\mu (M_1 - M_2) g}{M_1}R}$

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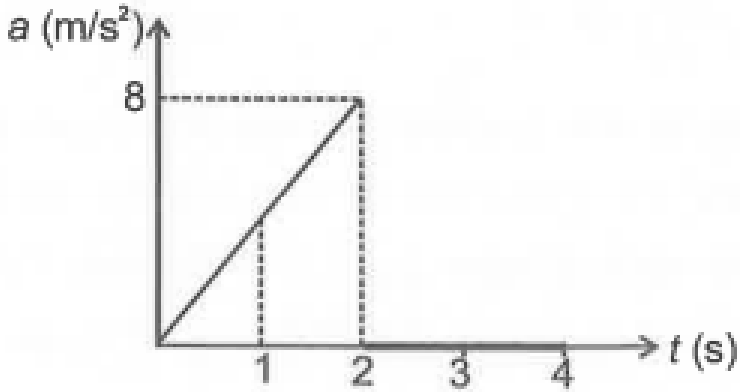
265. A car starts from rest at time t = 0 and it a-t graph is shown in figure. A coin is initially at rest on the floor of the car. At t = 1 s the coin begins to slip and it stops slipping at t = 3 s. The coefficient of static friction between the floor and the coin is (g = 10 m/s^2)



A. 0.5

B. 0.4

C. 0.3

D. 0.2

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266. A block rests on a rough plane whose inclination θ to the horizontal can be varied. Which of the following graphs indicates how the friction force F between the block and the plane varies as θ is increased?

A. (##AAK_TEST_05_NEET_YEAR(19)_PHY_E05_039_Q01##)

.jpg

B. (##AAK_TEST_05_NEET_YEAR(19)_PHY_E05_039_Q02##)

.jpg

C.

D.

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267. Consider a system of two identical masses.One is dropped from a height and another is thrown from ground with speed mu. The acceleration of the center of mass of the system at time t is

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

B. g

C. 2g

D. zero

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268. A wheel at constant angular acceleration with $3ra\frac{d}{s^2}$. During a $4s$ interval,it turns through an angel of $60rad$. If the wheel started from rest how long has it been in motion before the start of this $4s$ interval?

A. $3s$

B. $6s$

C. 9s

D. $12s$

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269. A spring is stretched by distance x and then compressed to same distance from its original length. The work done by the spring force is (k=spring constant)

A. zero

B. $\frac{1}{2}kx^2$

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

D. $-\frac{1}{2}kx^2$

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270. A boy weighing 250 N slides down upto the ground from the top of a slide. The friction offered by the slide is three tenth of his weight. The length and height of the slide is 10 m and 8 m, respectively. The work done by the slide on the boy as he comes down to the ground is

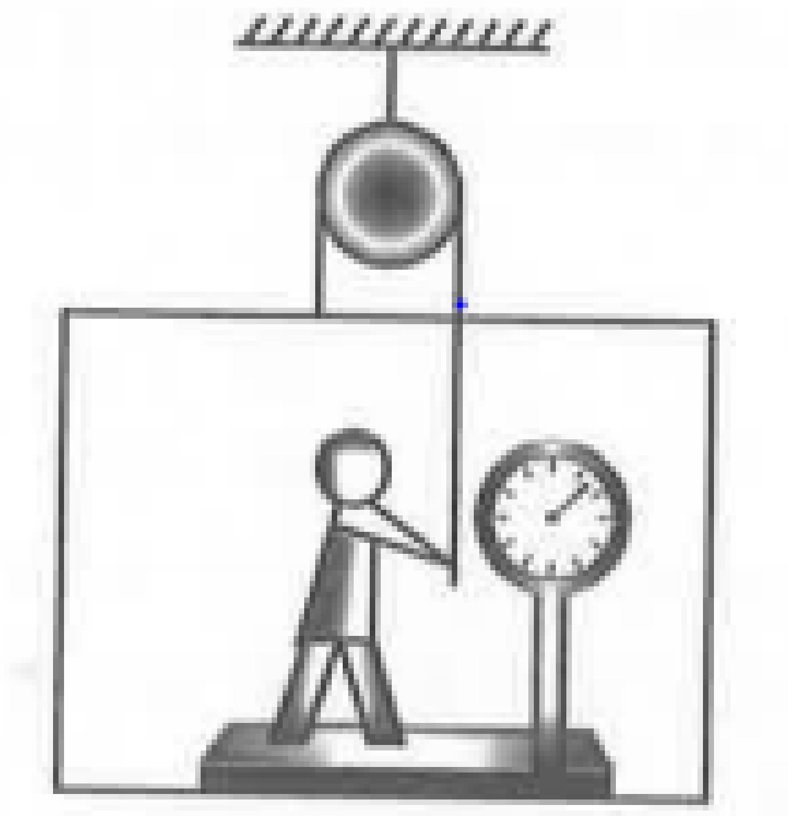
A. $-1250J$

B. $2000J$

C. -750 J

D. $750J$

271. In the given diagram, weight of the man is 60 kg and the weight of the machine, box, rope and pulley are neglected. If the man manages to keep the box at rest, then the reading of the machine will be



A. Equal to weight of a man

B. More than weight of a man

C. Less than the weight of a man

D. Zero

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272. A particle moves in the x-y plane under the action of a force $\overrightarrow{F}$ such that its linear momentum $\overrightarrow{P}$ at any time t is $\overrightarrow{P} = 2\cos t\hat{i} + 2\sin t\hat{j}$. The angle between $\overrightarrow{F}$ and $\overrightarrow{P}$ at a given time t will be

A. $\frac{\pi}{6}$

B. π

C. Zero

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

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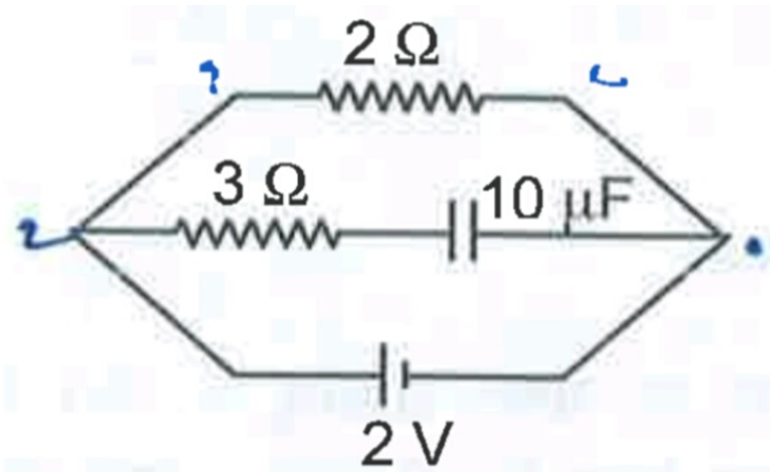
273. The charge on the capacitor of capacitance $10\mu F$ in steady state condition in the circuit shown is



A. $10\mu C$

B. Zero

C. $20\mu C$

D. $15\mu C$

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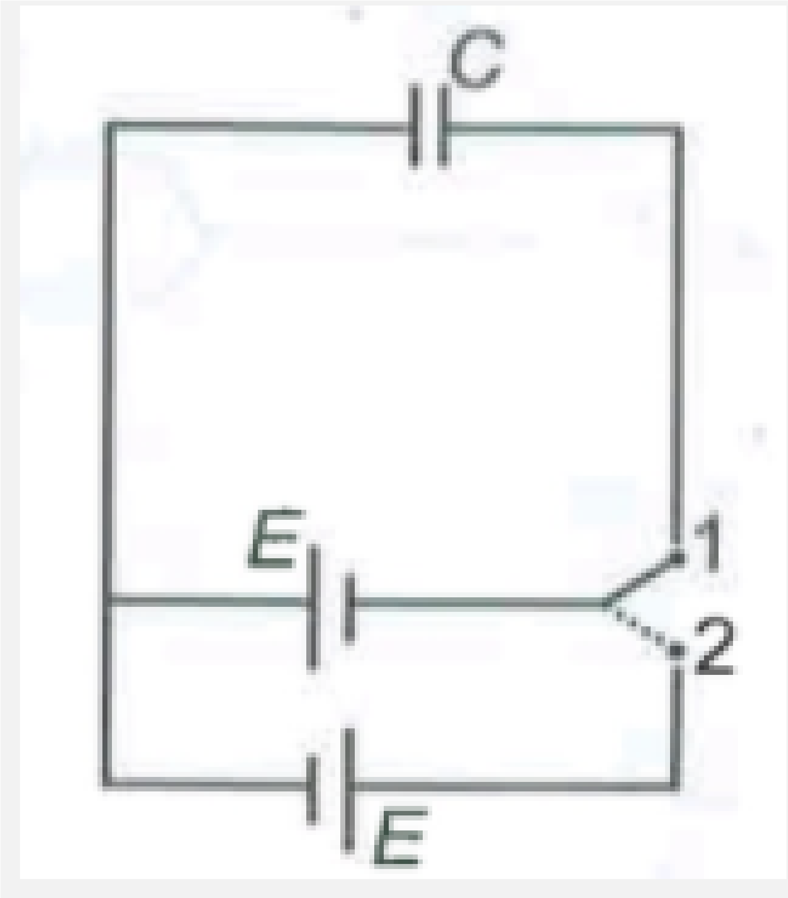
274. The capacitor C shown in the figure is in steady state condition when switch is shifted from position 1 to position 2.The heat liberated in the process is



A. $2CE^2$

B. Zero

C. $\frac{1}{2}CE^2$

D. $1CE^2$

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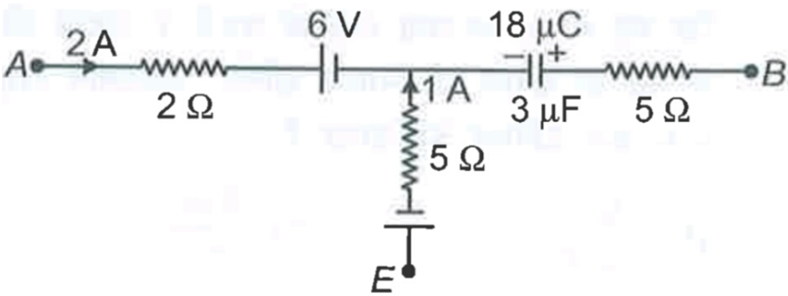
275. The potential difference $(V_A - V_B)$ between points A and B in a part of an electrical circuit shown in the figure at the instant shown is



A. 14 volts

B. 31 volts

C. 9 volts

D. 19 volts

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276. The electric field in a region of space is given by $E = 5\hat{i} + 2\hat{j} N / C$. The flux of E due ot this field through an area $1m^2$lying in the y-z plane, in SI units is

A. $\sqrt{29}$

B. Zero

C. 5

D. 10

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277. The unit of electrical conductivity is

A. $\frac{A^s}{Jm}$

B. $\frac{A^2 s}{W}$

C. $\frac{m}{ohm}$

D. $\frac{N}{C^2 m^2}$

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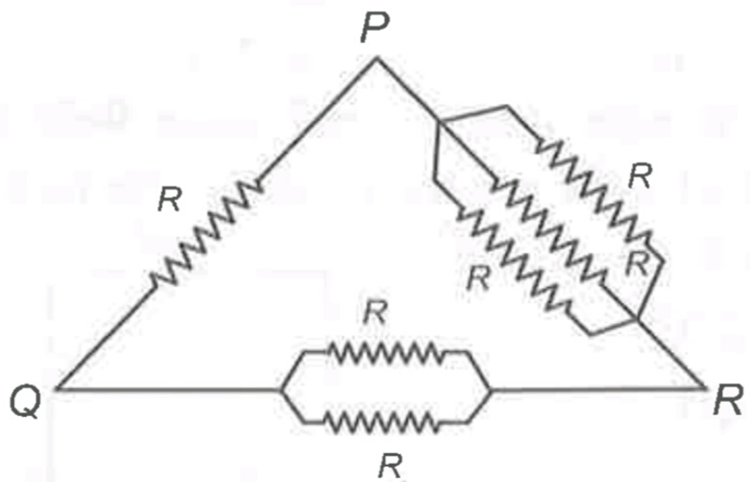
278. Six equal resistance,eacch of resistance R are connected as shown in the figure.Equivalent resistance between P and Q is



A. $\frac{11R}{5}$

B. $\frac{R}{6}$

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

D. $\frac{5R}{11}$

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279. Three point charges q are placed on vertices of an equilateral triangle of side length a. The charge Q that should be kept at centroid of triangle such that the system is in equilibrium is equal to

A. $-q\sqrt{3}$

B. $-3q$

C. $-\frac{q}{\sqrt{3}}$

D. $\frac{q}{\sqrt{3}}$

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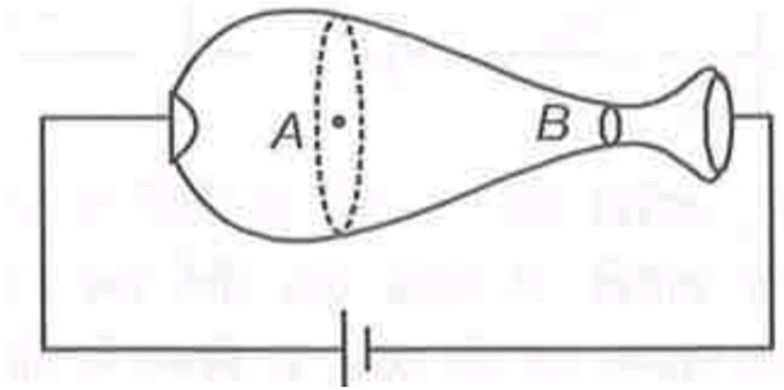
280. Considering a wire of non-uniform cross-section as shown.If the area of cross-section at A is double of the area of cross-section at point B.Ratio of heat energy dissipated in a unit volume per unit time at points A and B is



A. $\frac{1}{4}$

B. $\frac{4}{1}$

C. $\frac{1}{2}$

D. $\frac{2}{1}$

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281. A $1000W$ heater is designed to operate on a $120V$ line.The line voltage drops to $110V$. The percentage of heat output drops by

A. 16%

B. 30%

C. 9%

D. 27%

Answer: A

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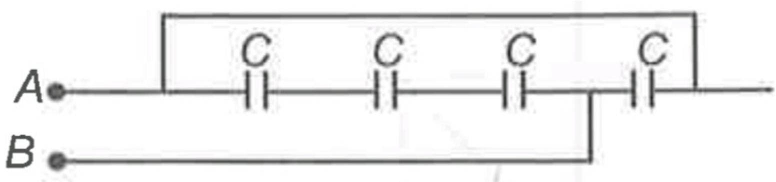
282. Equivalent capacitance between points A and B is



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

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

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

D. $4C$

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283. Variation of electric potential due to npn-conducting (positively charged) solid sphere with distance from its centre is best represented as

A.

B.

C.

D.

284. Four pointed charges are placed on vertices of a square.If all the charges are brought to any one of the vertices.The change in potential at the centre of square due to this would be

A. Dependent on polarity of charges

B. A non-zero constant

C. Zero

D. Infinite

Answer: C

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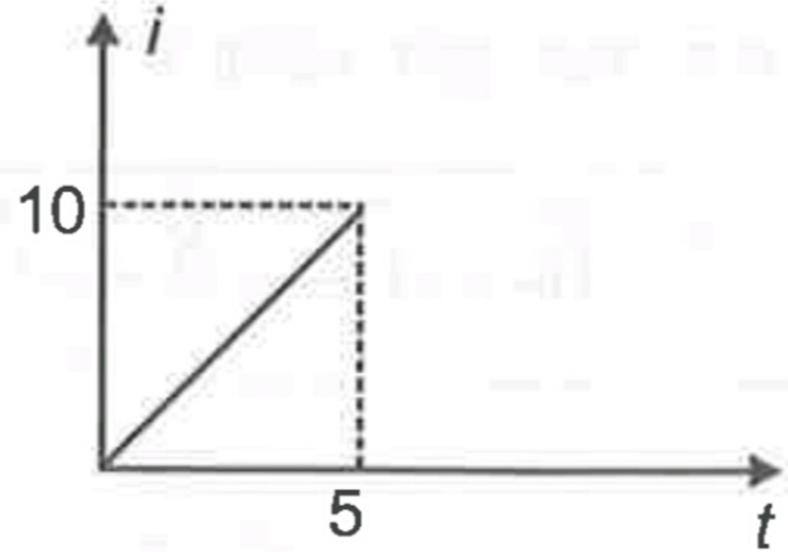
285. Current passing through a resistor of resistance 5Ω varies with time as shown in the graph. Heat generated in the resistance during $3s$ is equal to



A. $180J$

B. $90J$

C. $25J$

D. $625J$

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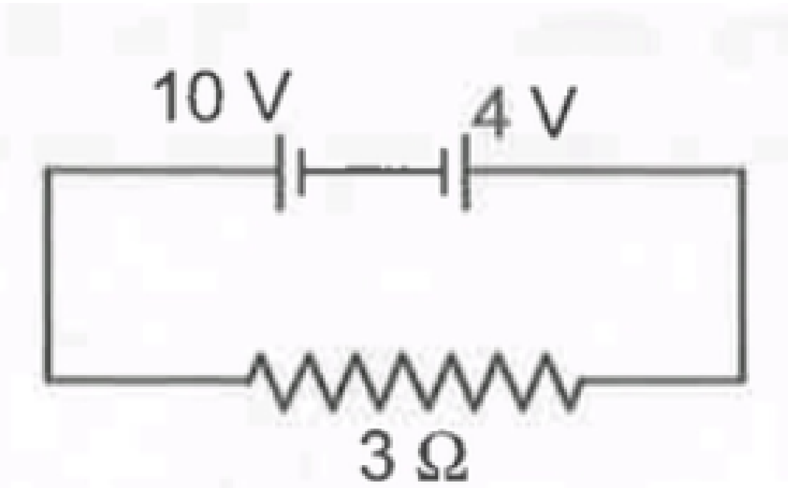
286. In the circuit shown,choose the correct option (All batteries are ideal)



A. Power dissipated in 3Ω resistance is $12W$

B. Current in the circuit is $6A$

C. Power supplied by $10V$ battery is $40W$

D. Power consumed by $4V$ battery is $2W$

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287. Figure shows two conducting thin concentric shells of radii r and $3r$. The outer carries charge q. Inner shell in neutral. Find the charge that will flow from inner shell to earth after the switch S is closed

A. q

B. Zero

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

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

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288. A charge q is uniformly distributed over a quarter circular ring of radius r. The magnitude of electric field strength at the centre of the ring will be

A. $\frac{\sqrt{2}q}{\pi\varepsilon_0 r^2}$

B. $\frac{q}{4\pi\varepsilon_0 r^2}$

C. $\frac{q}{\sqrt{2}\pi^2\varepsilon_0 r^2}$

D. $\frac{q}{\pi^2\varepsilon_0 r^2}$

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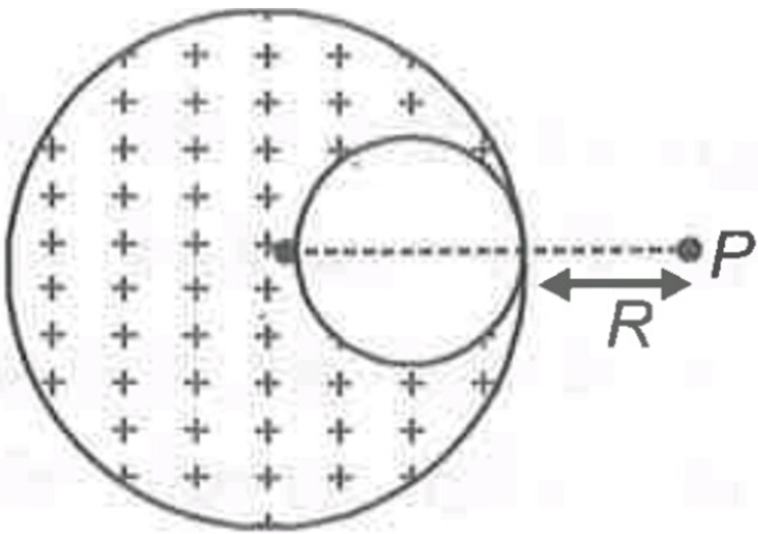
289. The electric potential due to uniformly charged sphere of radius R,having volume charge density rho having a spherical cavity of radius $\frac{R}{2}$ as shown as in figure at point p is



A. $\frac{7\rho R^2}{3\varepsilon_0}$

B. $\dfrac{2\rho R^2}{\varepsilon_0}$

C. $\dfrac{1\rho R^2}{36\varepsilon_0}$

D. $\dfrac{5\rho R^2}{36\varepsilon_0}$

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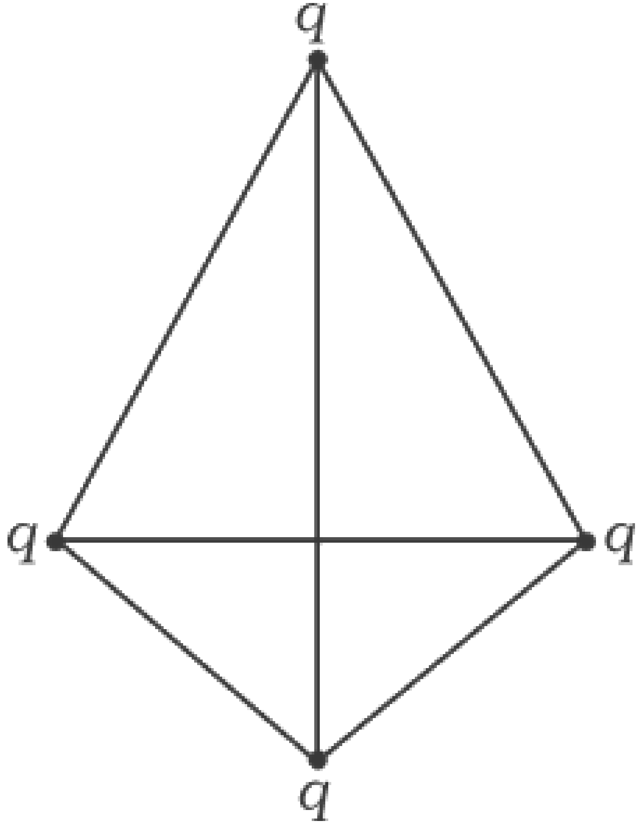
290. Four similar point charges q are located at the vertices of a tetrahedron with an edge a. the energy of the interaction of charges is:



A. $\frac{3q^2}{4\pi \varepsilon_0 a}$

B. $\frac{q^2}{4\pi \varepsilon_0 a}$

C. $\frac{q^2}{\pi \varepsilon_0 a}$

D. $\frac{3q^2}{2\pi \varepsilon_0 a}$

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291. If potentiometer wire of length L and resistance 10Ω is connected in series with battery of emf $2.5V$ and a resistance in its primary circuit.The null point corresponding to a cell of a emf $1V$ is obtained at a distance $\frac{L}{2}$.If the resistance in the primary circuit is doubled then the position of new null point will be

A. $0.6L$

B. $0.8L$

C. $4L$

D. $0.5L$

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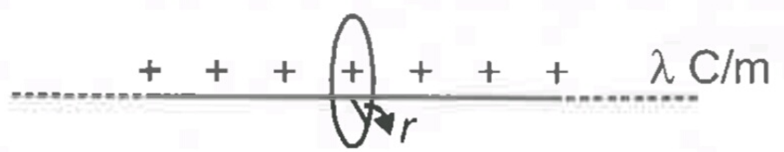
292. The flux of electric field through the circular region of radius r as shown in the figure is



A. $\frac{\lambda r}{\varepsilon_0}$

B. Zero

C. $\frac{\lambda r}{2\varepsilon_0}$

D. $\frac{2\lambda r}{\varepsilon}$

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293. A particle of mass m and charge q is oscillating simple harmonically from a string of length l.Now a vertical electric field of magnitude $E=\frac{mg}{2q}$ is switched on.The ration of new time period to old time period is

A. A. $2:1$

B. B. 1:2`

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

D. D. $1:1$

294. If the electric potential in a region is represented as $V = 2x + 3y - 4z$.Then electric field vector will written as

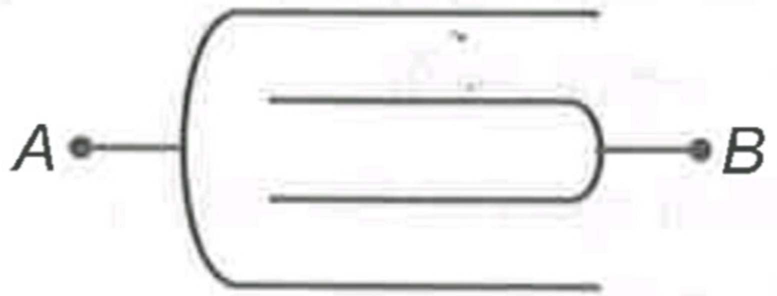
A. $2\hat{i} + 3\hat{j} + 4\hat{k}$

B. $-2\hat{i} - 3\hat{j} + 4\hat{k}$

C. $-2\hat{i} + 3\hat{j} - 4\hat{k}$

D. $2\hat{i} + 3\hat{j} - 4\hat{k}$

295. Four conducting plates of equal area A are separated by distance d and are arranged as shown.The equivalent capacitance between A and B is



A. $\frac{4\varepsilon_0 A}{d}$

B. $\frac{\varepsilon_0 A}{d}$

C. $\frac{2\varepsilon_0 A}{d}$

D. $\frac{3\varepsilon_0 A}{d}$

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296. Eight equal point charges are placed at corners of a cube side length a. The potential and electric field magnitude at the centre of cube will be

A. A. $\frac{4q}{\sqrt{3}\pi\varepsilon_0 a}, 0$

B. B. $\frac{4q}{\sqrt{3}\pi\varepsilon_0 a}, \frac{4q}{3\pi\varepsilon_0 a^2}$

C. C. $0, 0$

D. D. $\frac{16q}{\sqrt{3}\pi\varepsilon_0 4a}$

Answer: D

297. A charge $+Q$ is placed on middle of edge of the cube.Then electric flux through cube due to field of charge $+Q$ is

A. A. $\frac{Q}{8\varepsilon_0}$

B. B. $\frac{Q}{\varepsilon_0}$

C. C. $\frac{Q}{6\varepsilon_0}$

D. D. $\frac{Q}{4\varepsilon_0}$

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298. Two charges each having magnitude q and same polarity are fixed some distance apart.A point charge Q

is kept on exactly middle of the line joining the two charges.Then equilibrium of Q is

A. Stable along the line along perpendicular bisector of the line joining the two charges if Q is of same polarity as that of q

B. Neutral along the line joining the two charges for any polarity of Q

C. Stable along the line joining two charges if charge Q is of opposite polarity to that of q

D. Unstable along the line joining two charges if charge Q is of opposite polarity to that of q

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299. When no current passes through a conductor,choose which one of the following is incorrect?

A. The average velocity of a free electrons,over a large period of time is zero

B. The average of the velocities of all the free electrons at an instant is zero

C. The free electrons are randomly moving

D. The average speed of a free electron,over a large period of time is zero

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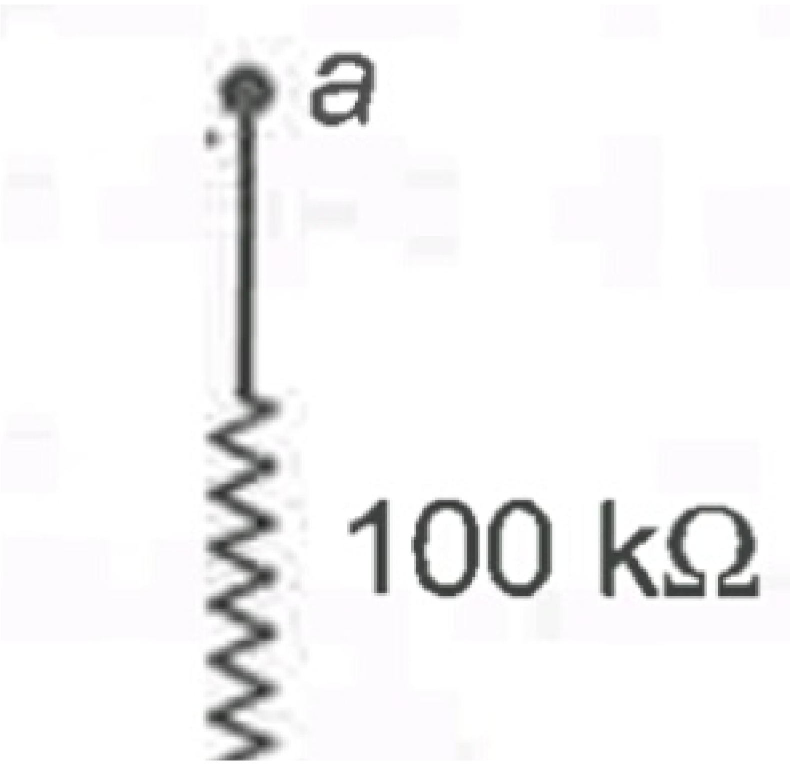
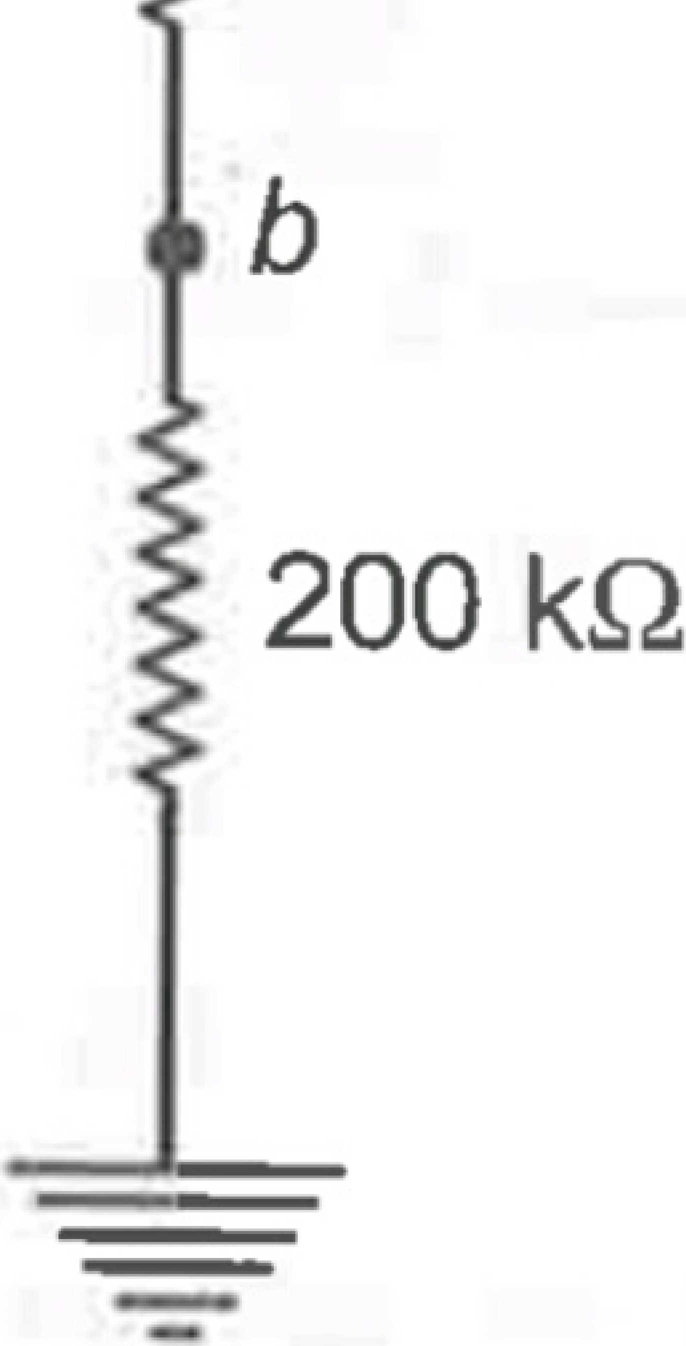
300. Point a in the figure shown is maintained at potential of $300V$. The reading of a voltmeter of a resistance $3 \times 10^4 \Omega$, when connected between point b and ground is




b
200 kΩ

A. $50V$

B. $62V$

C. $10V$

D. $42V$

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301. The temperature coefficient of resistance of a wire is 0.00125 per $\hat{}\ \circ C$ At 300 K. its resistance is1Ω The resistance of this wire will be 2Ω at :

A. $1127^{\circ}C$

B. $1127K$

C. $827K$

D. $827^{\circ}C$

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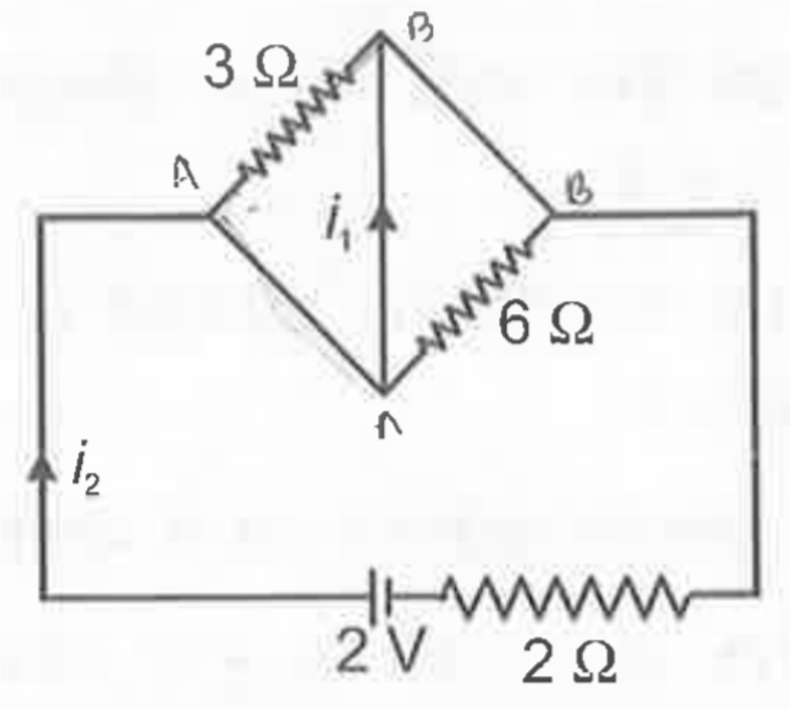
302. In the circuit shown $\frac{i_1}{i_2}$ will be equal to



A. 1

B. Zero

C. 0.5

D. 2

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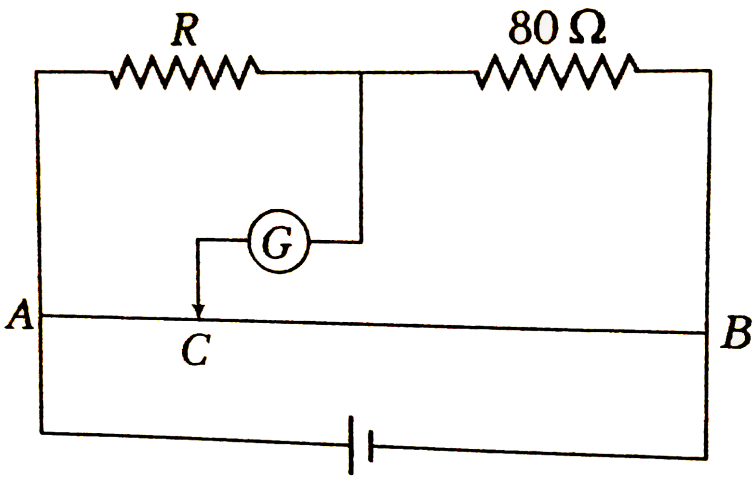
303. AB is a wire of uniform resistance. The galvanometer G shows no current when the length AC = 20 cm and CB = 80 cm. The resistance R is equal to



A. 20Ω

B. 40Ω

C. 2Ω

D. 8Ω

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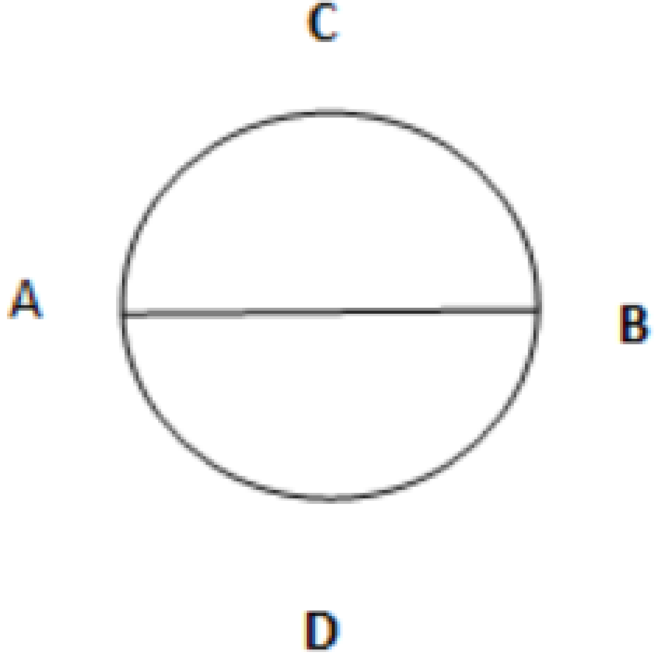
304. A wire of resistance 4Ω is bent to form a circle. The resistance point A and B will be



A. $\frac{9}{8}\Omega$

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

C. 4Ω

D. $\frac{8}{9}\Omega$

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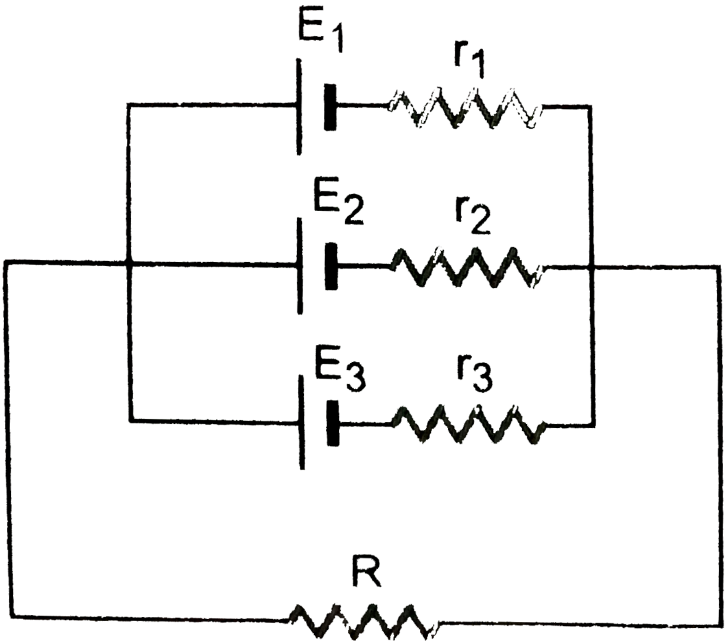
305. If three cell are connected in parallel then equivalent emf....... and equivalent internal resistance is .....



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306. To form a capacitor equivalent of $16\mu F$, with breakdown voltage of $1000V$, how many minimum number of capacitance marked $8\mu F, 250V$ are required?

A. A. 16

B. B. 32

C. C. 2

D. D. 8

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307. A current passes through a wire of nonuniform cross-section. Which of the following quantites are independent of the cross section?

A. Electric current

B. Drift speed

C. Current density

D. Both (1) & (2)

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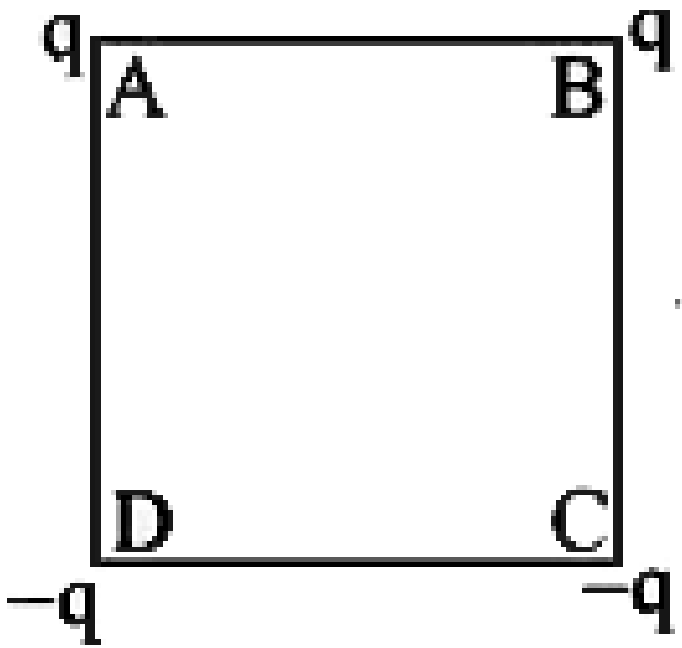
308. Charges are placed on the vertices of a square as shown in figure below. Let E be the electric field and V be the potential at the centre. If the charges on A and B are interchanged with those on D and C respectively, then :



A. Only b is ture

B. Only a is true

C. a, b, c, d all are true

D. Only band c are true

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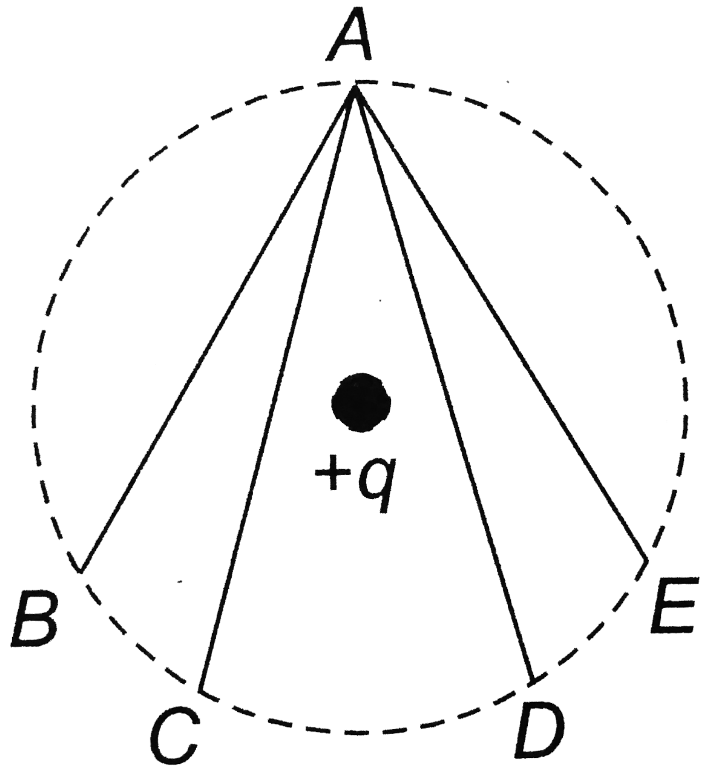
309. In the electric field of a point chargde q, a cetrain charge is carried from point A to B, C, D and E. Then the work done



A. Is least along AD

B. Is zero along any of the choosen path

C. Is least along path AB

D. Is same along all paths and is positive non-zero constant

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310. Equipotential surface associated with an electric field which increasing in magntude along the x drection are

A. Planes parallel to x-z plane

B. Coaxial cylinders of increasing radii around x-axis

C. Planes parallel to y-z plane

D. Planes parallel to x-y plane

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311. 10 g of ice at 0 C is slowly melted to water at 0 C. The latent heat of melting is 80 cal /g. the change in entropy is ?(cal/k)

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312. The pressure and density of a gas (ϒ =5/3) changes adiabatically from (p1,d1) to (p2,d2).If d2/d1=27 the find value of p2/p1 ?

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313. 27 small drops of same size are charged to V volts each. If they coalesce to form a single large drop, then its potential will be

A. $3V$

B. $9V$

C. $\frac{V}{27}$

D. $27V$

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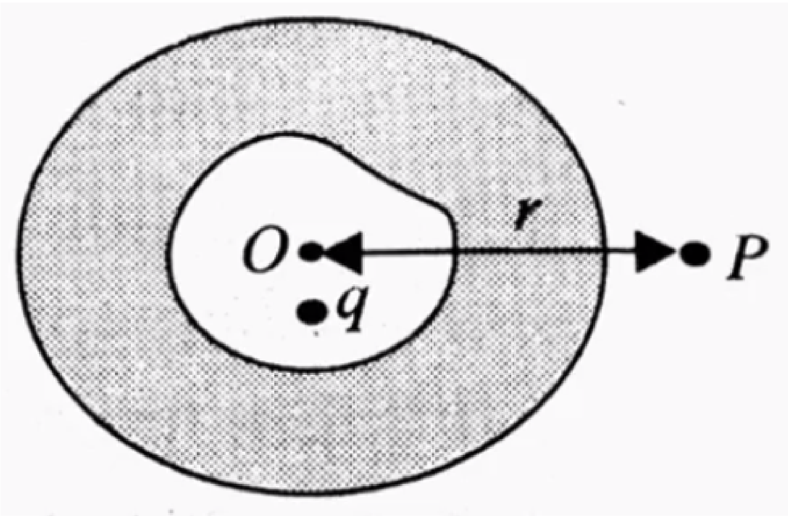
314. A point charge q is kept inside an electrically neutral shell with its outer surface spherical in shape then the potential at point P would be



A. $\frac{q}{4\pi\varepsilon_0 R}$

B. $\frac{q}{4\pi\varepsilon_0 r} - \frac{q}{4\pi\varepsilon_0 r}$

C. $\frac{q}{4\pi\varepsilon_0 r}$

D. $\frac{q}{4\pi\varepsilon_0 r_0}$

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