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PHYSICS

BOOKS - NTA MOCK TESTS

NTA NEET SET 93

Physics

1. If M_o is the mass of an oxygen isotope $_8O^{17}$, M_p and M_N are the masses of a

proton and neutron respectively, the nuclear binding energy of the isotope is:

A. $M_O c^2$

B. $(M_O - 17M_n)c^2$

C. $(M_O 8M_n)c^2$

D. $(8M_p + 9M_n - M_O)C^2$

Answer: D

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2. A particle moves in the plane xy with constant acceleration 'a' directed along the negative y-axis. The equation of motion of the particle has the form $y = px - qx^2$ where p and q are positive constants. Find the velocity of the particle at the origin of co-ordinates.

A. $\sqrt{\frac{a\sqrt{1+p^2}}{2p}}$

B. $\sqrt{\frac{a\sqrt{1+p^2}}{2q}}$

C. $\sqrt{\frac{a\sqrt{1+q^2}}{p}}$

D. $\sqrt{\frac{a\sqrt{1+p^2}}{q}}$

Answer: A

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3. Equal masses of two substance of densities ρ_1 and ρ_2 are mixed together. What is the density of the mixture?

A. $\frac{1}{2}(\rho_1 + \rho_2)$

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

C. $\frac{\rho_1 \rho_2}{(\rho_1 + \rho_2)}$

D. $\frac{2\rho_1 \rho_2}{(\rho_1 + \rho_2)}$

Answer: D

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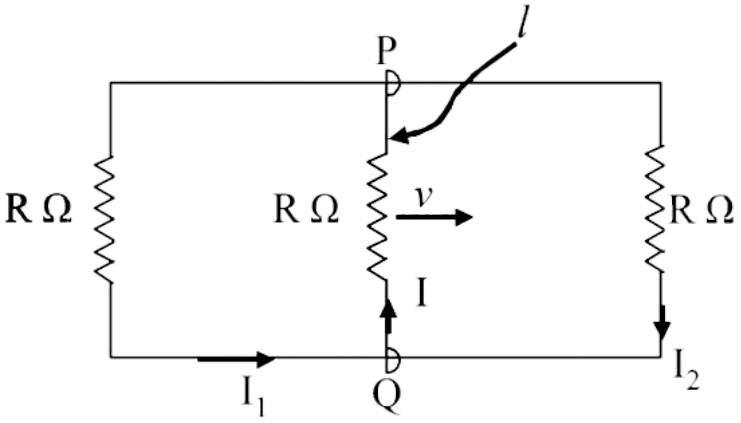
4. A rectangular loop has a sliding connector PQ of length l and resistance $R(\Omega)$ and it is moving with a speed v as shown. The set-up is placed in a uniform magnetic field going into the plane of the paper. The three currents

I_1, I_2 and I are



A. $I_1 = -I_2 = \frac{Blv}{R}, I = \frac{2Blv}{R}$

B. $I_1 = I_2 = \frac{Blv}{3R}, I = \frac{2Blv}{3R}$

C. $I_1 = I_2 = I = \frac{Blv}{R}$

D. $I_1 = I_2 = \frac{Blv}{6R}, I = \frac{Blv}{3R}$

Answer: B

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5. A charge of 8.0 mA in the emitter current brings a charge of 7.9 mA in the collector current. The values of α and β are

A. 0.99,90

B. 0.96,79

C. 0.97,99

D. 0.99,79

Answer: D

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6. The rate of change of torque $'\tau'$ with deflection θ is maximum for a magnet suspended freely in a uniform magnetic field of induction B when θ is equal to

A. $\theta = 90^\circ$

B. $\theta = 60^\circ$

C. $\theta = 45^\circ$

D. $\theta = 0^\circ$

Answer: D

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7. The threshold frequency for a certain metal is 3.3×10^{14} Hz. If light of frequency 8.2×10^{14} Hz is incident on the metal, predict the cut-off voltage for the photoelectric emission.

A. 4.9 V

B. 3.0 V

C. 2.0 V

D. 1 V

Answer: C

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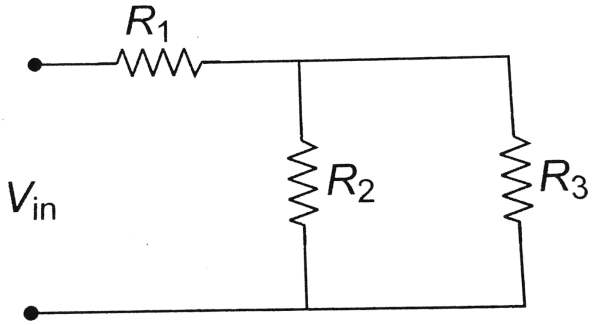
8. For ensuring dissipation of same energy in all three resistors (R_1, R_2, R_3) connected as

shown in figure, their values must be related s



A. $R_1 = R_2 = R_3$

B. $R_2 = R_3$ and $R_1 = 4R_2$

C. $R_2 = R_3$ and $R_1 = R_2/4$

D. $R_1 = R_2 + R_3$

Answer: C

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9. A solid sphere of radius R_1 and volume charge density $\rho = \frac{\rho_0}{r}$ is enclosed by a hollow sphere of radius R_2 with negative surface charge density σ, such that the total charge in the system is zero . ρ_0 is positive constant and r is the distance from the centre of the sphere . The ratio R_2 / R_1 is

A. $\frac{\sigma}{\rho_0}$

B. $\sqrt{\frac{2\sigma}{\rho_0}}$

C. $\sqrt{\frac{\rho_0}{2\sigma}}$

D. $\frac{\rho_0}{\sigma}$

Answer: C

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10. If the maximum particle velocity is 4 times of the wave velocity then relation between wavelength and amplitude is

A. $2\pi A$

B. πA

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

D. $\frac{\pi A}{4}$

Answer: C

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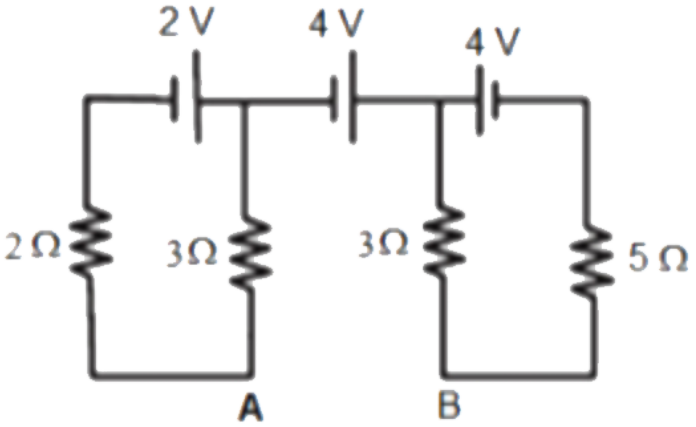
11. In given circuit , the potential difference between points A and B is



A. 6.7 V

B. 3.7 V

C. 4 V

D. 10 V

Answer: A

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12. Two identical wires have the same fundamental frequency of 400 Hz . when kept under the same tension. If the tension in one wire is increased by 2% the number of beats produced will be

A. 4

B. 8

C. 2

D. 1

Answer: A

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13. Average value of KE and PE over entire time period is

A. $0, \frac{1}{2}m\omega^2A^2$

B. $\frac{1}{2}m\omega^2A^2, 0$

C. $\frac{1}{2}m\omega^2A^2, \frac{1}{2}m\omega^2A^2$

D. $\frac{1}{4}m\omega^2A^2, \frac{1}{4}m\omega^2A^2$

Answer: D

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14. A block rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is 0.8. If the frictional force on the block is 10N, the mass of the block (in kg) is

A. 1 kg

B. 2 kg

C. 3 kg

D. 4 kg

Answer: B

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15. When an object is placed at a distance of 25 cm from a mirror, the magnification is m_1. The object is moved 15cm farther away with respect to the earlier position, and the

magnification becomes m_2. If $m_1/m_2 = 4$, then calculate the focal length of the mirror.

A. 20 cm, convex

B. 20 cm, concave

C. 10 cm, convex

D. 10 cm, concave

Answer: B

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16. Flash light equipped with a new set of batteries, produces bright white light. As the batteries wear out

A. The light intensity gets reduced with no change in its colour

B. Light colour changes first to yellow and then red with no change in intensity

C. It stops working suddenly while giving white light

D. Colour changes to red and also intensity gets reduced

Answer: D

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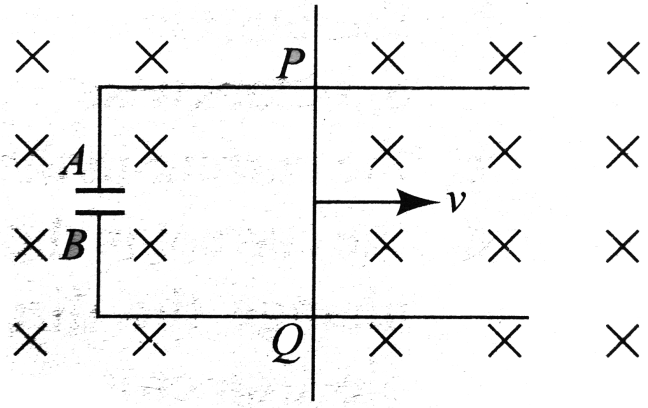
17. A conducting rod PQ of length $L = 1.0m$ is moving with a uniform speed $v = 2.0ms^{-1}$ in a uniform magnetic field $B = 4.0T$ directed into the plane of the paper.

A capacitor of capacity $C = 10\mu F$ is

connected as shown in , then



A. $qA = -80\mu C$ and $qB = +80\mu C$

B. $qA = +80\mu C$ and $qB = -80\mu C$

C. $qA = 0 = qB$

D. Charge stored in the capacitor increase exponentially with time

Answer: B

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18. A cart of mass M is tied to one end of a massless rope of length $10m$. The other end of the rope is in the hands of a man of mass M. The entire system is on a smooth horizontal surface. The man is at $x = 0$ and the cart at $x = 10m$. If the man pulls the cart by the rope, the man and the cart will meet at the point

A. x = 0

B. x = 5 cm

C. x = 10 m

D. They will never meet

Answer: B

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19. 80 railway wagons all of same mass 5×10^3 kg are pulled by an engine with a force of 4×10^5N. The tension in the coupling

between 30 th and st 31st wagon from the engine is :-

A. $25 \times 10^4 N$

B. $40 \times 10^4 N$

C. $20 \times 10^4 N$

D. $32 \times 10^4 N$

Answer: A

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20. The satellite of mass m revolving in a circular orbit of radius r around the earth has kinetic energy E. then, its angular momentum will be

A. $\sqrt{\frac{E}{mr^2}}$

B. $\frac{E}{2mr^2}$

C. $\sqrt{2Emr^2}$

D. $\sqrt{2Emr}$

Answer: C

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21. The average density of the earth

A. Is directly proportional to g

B. Is inversely proportional to g

C. Does not depend on g

D. Is a complex function of g

Answer: A

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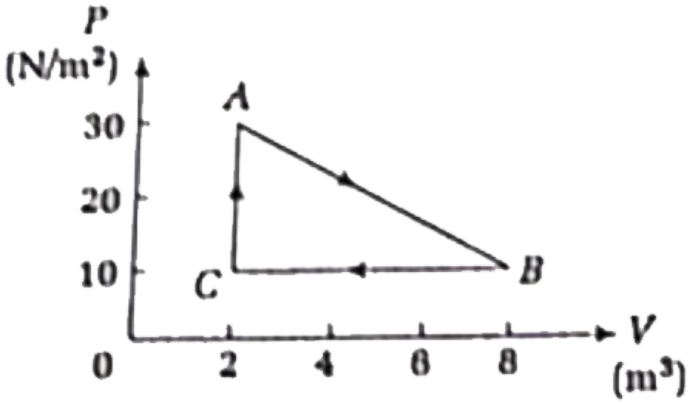
22. A gas undergones the cyclic process shown in the figure. The cycle is repeated 100 time per minute. The power generated is



A. 240 W

B. 100 W

C. 60 W

D. 120 W

Answer: B

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23. Find the radius of curvature of convex surface of a plano convex lens, whose focal length is $0.3m$ and $\mu = 1.5$.

A. 0.5 m

B. 0.75 m

C. 0.25 m

D. 1 m

Answer: D

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24. A particle located at $x = 0$ at time $t = 0$, starts moving along with the positive $x - direction$ with a velocity 'v' that varies as $v = a\sqrt{x}$. The displacement of the particle varies with time as

A. t^3

B. t

C. $t^{1/2}$

D. t^2

Answer: D

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25. A force $\vec{F} = 2\hat{i} + 3\hat{j}N$ is applied to an object that is pivoted about a fixed axle aligned along the z coordinate axis. If the force is applied at the point $\vec{r} = 4\hat{i} + 5\hat{j}m$,

(a) the magnitude of the net torque about the z and (b) the direction of the torque vector τ.

A. 4

B. 1

C. 2

D. 10

Answer: C

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26. Consider an interference pattern between two coherent sources. If I_1 and I_2 be intensities at points where the phase difference are $\frac{\pi}{3}$ and $\frac{2\pi}{3}$ and respectively , then the intensity at maxima is

A. $\frac{I_2 - 3I_1}{2}$

B. $\frac{I_1 - 3I_2}{2}$

C. $\frac{3I_2 - I_1}{2}$

D. $\frac{3I_1 - I_2}{2}$

Answer: D

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27. K_α wavelength emitted by an atom of atomic number Z=11 is λ. Find the atomic number for an atom that emits K_α radiation with wavelength 4λ.

(a) Z=6 (b) Z=4

(c) Z=11 (d) Z=44.

A. Z = 6

B. Z = 4

C. Z = 11

D. Z = 44

Answer: A

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28. A steel wire of length l has a magnetic moment M. It is bent into a semicircular arc. What is the new magnetic moment?

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

B. $\frac{2M}{\pi}$

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

D. $\frac{4M}{\pi}$

Answer: B

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29. The work of 146 kJ is performed in order to compress one kilo mole of a gas adiabatically and in this process the temperature of the gas increases by $7^{\circ}C$. The gas is $\left(R = 8.3ml^{-1}Jmol^{-1}K^{-1}\right)$

A. Diatomic

B. Tiatomic

C. A mixture of monoatomic and diatomic

D. None of the above

Answer: A

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30. In a double slit experiment, the separation between the slits is d = 0.25 cm and the distance of the screen D = 100 cm from the

slits. If the wavelength of light used is $\lambda = 6000\text{Å}$ and I_0 is the intensity of the central bright fringe, the intensity at a distance $x = 4 \times 10^{-5} m$ from the central maximum is

A. I_0

B. $\frac{I_0}{2}$

C. $\frac{3I_0}{4}$

D. $\frac{I_0}{3}$

Answer: C

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31. A radio transmitter operates at a frequency of $880kHz$ and a power of $10kW$. The number of photons emitted per second are

A. 1.72×10^{31}

B. 1.327×10^{25}

C. 1.327×10^{37}

D. 1.327×10^{45}

Answer: A

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32. The radius of the first orbit of H-atom is 0.53 Å. Find the radius of the fifth orbit.

A. 121.5Å

B. 111Å

C. 331.25Å

D. 333Å

Answer: C

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33. The bob of a simple pendulum performs SHM with period T in air and with period T_1 in water. Relation between T and T_1 is (neglect friction due to water, density of the material of the bob is = $\frac{9}{8} \times 10^3 \frac{kg}{m^3}$, density of water = $10^3 \frac{kg}{m^3}$)

A. $T_1 = 3T$

B. $T_1 = 2T$

C. $T_1 = T$

D. $T_1 = \frac{T}{2}$

Answer: A

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34. In a uniform circular motion, the centripetal acceleration is

A. Towards the centre of the circular path and perpendicular to the instantaneous velocity

B. Away from the centre of the circular path and perpendicular to the instantaneous velocity

C. A variable acceleration making 45° with the instantaneous velocity

D. A variable acceleration , parallel to the instantaneous velocity

Answer: A

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35. In a vernier callipers, N divisions of vernier scale coincide with (N-1) divisions of main scale (in which 1 division represents 1 mm). The least count of the instrument in cm should be

A. $\frac{1}{N-1}$

B. $\frac{1}{10N}$

C. N - 1

D. N

Answer: B

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36. A nonzero external force on a system of particles. The velocity and the acceleration of the cente of mass are found to be v_0 and a_0 at an instant t. It is possible that

A. $v_0 = 0, a_0 = 0$

B. $v_0 = 0, a_0 \neq 0$

C. $v_0 \neq 0, a_0 = 0$

D. $v_0 \neq 0, a_0 = 1$

Answer: B

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37. We have two (narrow) capillary tubes T and T . Their lengths are l and l and radii of cross-section are r and r respectively. The rate of flow of water under a pressure difference P through tube T is $8cm3/\sec.$ If $l = 2l$ and $r = r$ what will be the rate of flow when the two tubes are connected in series and pressure difference across the combinatin is same as before $(= P)$

A. $4cm^3s^{-1}$

B. $\frac{16}{3}cm^3s^{-1}$

C. $\frac{8}{17}cm^3s^{-1}$

D. $8cm^3s^{-1}$

Answer: B

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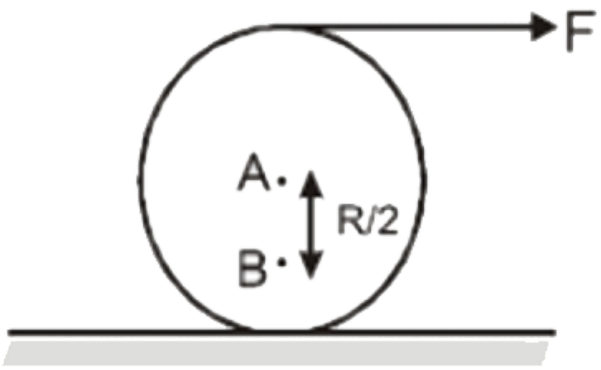
38. A disc of mass m and radius R, is placed on a smooth text service fixed surface . Point A is the geometrical centre of the disc while point

B is the centre of mass of the disc . The moment of inertia of the dics about an axis through its centre of mass and perpendicular to the plane of the figure is I .A constant force F is applied to the top of the disc . The acceleration of the centre A of the disc at the instant B is below A (on the same vertical line) will be :



A. $\frac{F}{m}$

B. $\frac{F}{m} + \frac{3FR^2}{4l}$

C. $\frac{F}{m} + \frac{FR^2}{4l}$

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

Answer: B

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39. A particle enters uniform constant magnetic field region with is initial velocity parallel to the field direction. Which of the

following statements about its velocity is correct ?(neglect the effects of other fields)

A. There is change in both magnitude and direction

B. There is no change

C. There is change only in magnitude

D. There is change only in direction

Answer: B

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40. The kinetic energy of a particle moving along a circle of radius R depends on the distance covered s as $T = as^2$, where a is ticle as a function of s.

A. $2a\frac{R^2}{s}$

B. $2as\left[1+\frac{s^2}{R^2}\right]^{\frac{1}{2}}$

C. $\frac{2as^2}{R}$

D. 2 as

Answer: B

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41. A stone of mass 2 kg is projected upwards with KE of 98 J. The height at which the KE of the body becomes half its original value, is given by (take, $g = 9.8ms^{-2}$)

A. 5 m

B. 2.5 m

C. 1.5 m

D. 0.5 m

Answer: B

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42. If a proton and anti-proton come close to each other and annihilate, how much energy will be released ?

A. $1.5 \times 10^{-10} J$

B. $3 \times 10^{-10} J$

C. $4.5 \times 10^{-10} J$

D. $2 \times 10^{-10} J$

Answer: B

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43. The electron density of intrinsic semiconductor at room temperature is $10^{16}m^{-3}$. When doped with a trivalent impurity , the electron density is decreased to $10^{14}m^{-3}$ at the same temperature . The majority carrier density is

A. $10^{16}m^{-3}$

B. $10^{18}m^{-3}$

C. $10^{21}m^{-3}$

D. $10^{20}m^{-3}$

Answer: B

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44. Two parallel plate capacitors of capacitances C and 2C are connected in parallel and charged to a potential difference V. The battery is then disconnected and the

region between the plates of the capacitor C is completely filled with a material of dielectric constant K. The potential differences across the capacitors now becomes.....

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

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

C. $\frac{3V_0}{4}$

D. V_0

Answer: C

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45. A steel ball of mass 0.1 kg falls freely from a height of 10 m and bounces to a height of 5.4 m from the ground. If the dissipated energy in this process is absorbed by the ball, the rise in its temperature is (specific heat of steel $= 460K/kg^{\circ}/C, g = 10m/s^2$)

A. $0.01^{\circ}C$

B. $0.1^{\circ}C$

C. $1^{\circ}C$

D. $1.1^{\circ}C$

Answer: B

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