PHYSICS

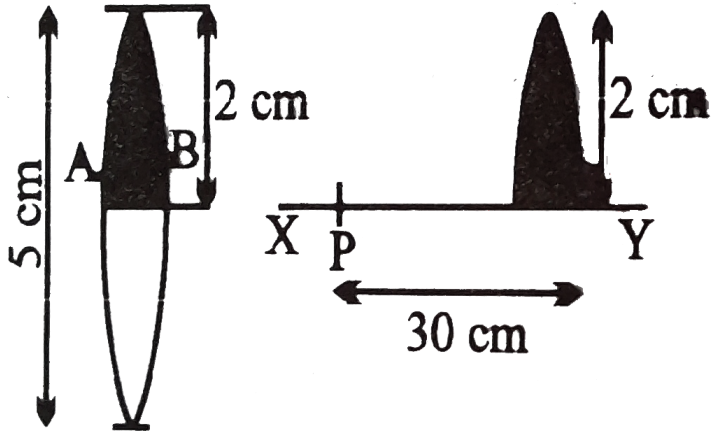
BOOKS - D MUKHERJEE PHYSICS (HINGLISH)

PRACTICE WORKSHEET 1

Straight Objective Type

1. A converging lens of focal length $20cm$ and diameter $5cm$ is cut along the line AB. The part

of the lens shown shaded in the diagram is now used to form an image of a point Pplaced $30cm$away from it on the lineXY.Which id perpendicualr to the plane of the lens.The image of$P$will be formed.



A. on XY

B. 1 cm below XY

C. 0.5 cm below XY

D. 0.5 cm XY

Answer: C

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2. A hydrogen atom in an excited state emits a photon which has the longest wavelength of the Paschen series. Further emissions from the atom cannot inculde the

A. longest wavelength of the Lyman series

B. second-longest wavelength of the Lyman series

C. longest wavelength of the Balmer series

D. Second longest wavelength of the Balmer series

Answer: D

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3. The two ends of a long cylinder containing gas are maintained at different temperatures. Which of the following quantites will have the same value throughout the cylinder?

A. Pressure

B. Density

C. The ratio of pressure to density

D. the number of molecules per unit volume

Answer: A

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4. Two conducting spheres of radii r and 3r initially have charges 3q & q respectively. Their separation is much larger their radii. If they are joined by a conductor of high resistance, the force between them will :

A. increase continuously

B. decrease continuously

C. first increase and then decrease

D. first decrease and then increase

Answer: C

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5. A train of length $l = 350m$ starts moving rectilinearly with constant acceleration $w = 3.0 \cdot 10^{-2} m / s^2$, $t = 30s$ after the start the locomotive headlight is switched on (event 1), and $\tau = 60s$ after that event the tail signal

light is switched on (event 2). Find the distance between these events in the reference frames fixed to be train and to the Earth. How and at what constant velocity V relative to the Earth must a certain reference frame K move for the two events to occur in it at the same point?

A. $5ms^{-1}$ in a direction opposite to the train's motion

B. $10ms^{-1}$ in a direction opposite to the train's motion

C. $5ms^{-1}$ in the same direction as the train's motion

D. $10ms^{-1}$ in the same direction as the train's motion

Answer: A

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6. The xz plane separates two media A and B with refractive indices μ_1 & μ_2 respectively. A ray of light travels from A to B. Its directions

in the two media are given by the unut vectors, $\vec{r}_A = a\hat{i} + b\hat{j}$ & $\vec{r}_B \alpha\hat{i} + \beta\hat{j}$ respectively where $\hat{i}$ & $\hat{j}$ are unit vectors in the x & y directions. Then :

A. $\mu_1 = \mu_2\alpha$

B. $\mu_1\alpha = \mu_2 a$

C. $\mu_1 b = \mu_2\beta$

D. $\mu_1\beta = \mu_2 b$

Answer: A

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7. A thin uniform rod of mass m and length l is free to rotate about its upper end. When it is at rest, it receives an impulse J as its lowest point, normal to its length immediately after impact.

A. $2\pi\sqrt{l/g}$

B. $2\pi\sqrt{2l/3g}$

C. $2\pi\sqrt{3l/2g}$

D. $2\pi\sqrt{l/2g}$

Answer: B

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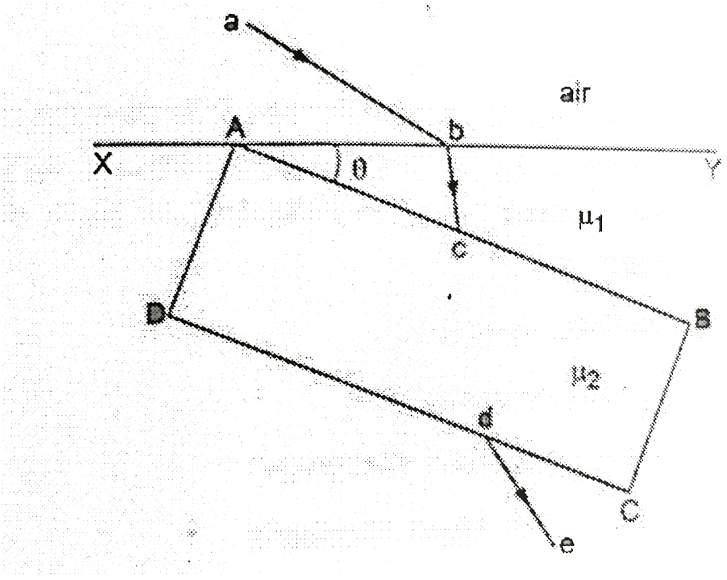
8.



A ray of light ab passing through air enters a liquid of refractive index μ_1 at the boundary XY. In the liquid, the ray is shown as bc. The

angle between ab and bc (angle of deviation) is δ. The ray then passes through a rectangular salb ABCD of refractive index $\mu_2(\mu_2 > \mu_1)$ and emerges from the slab as the ray de. The angle between XY and AB is θ. The angle between ab and de is

A. δ

B. $\delta + \theta$

C. $\delta + \sin^{-1}\left(\frac{\mu_1}{\mu_2}\right)$

D. $\delta + \theta - \sin^{-1}\left(\frac{\mu_1}{\mu_2}\right)$

Answer: A

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9. When unit mass of water boils to become steam at $100^\circ C$, it absorbs Q amount of heat. The densities of water and steam at $100^\circ C$ are ρ_1 and ρ_2 respectively and the atmospheric pressure is P_0. The increase in internal energy of the water is

A. Q

B. $Q + p_0\left(\frac{1}{\rho_1} - \frac{1}{\rho_2}\right)$

C. $Q + p_0\left(\frac{1}{\rho_2} - \frac{1}{\rho_1}\right)$

D. $Q - p_0\left(\frac{1}{\rho_1} - \frac{1}{\rho_2}\right)$

Answer: B

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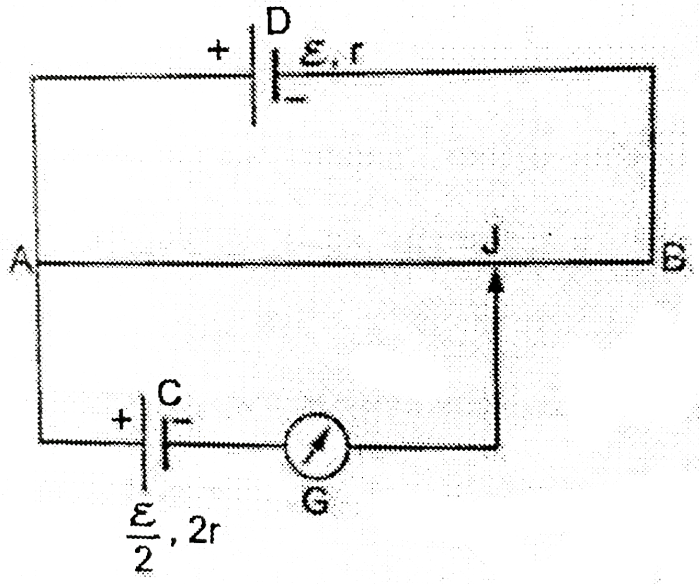
10.



In the figure, the potentiometer wire AB of

length L and resistance 9r is joined to the cell D fo emf E and internal resistance r. The emf of the cell C is E/2 and its internal resistance is 2r. The galvanometer G will show no deflection when the length AJ is

A. $\frac{4L}{9}$

B. $\frac{5L}{9}$

C. $\frac{7L}{18}$

D. $\frac{11L}{18}$

Answer: B

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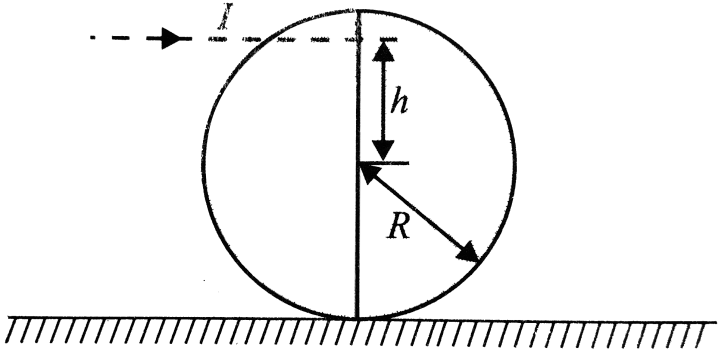
11. A solid sphere rests on a horizontal surface. A horizontal impulse is applied at height h from centre. The sphere starts rolling just after the application of impulse. The ratio h/r will be



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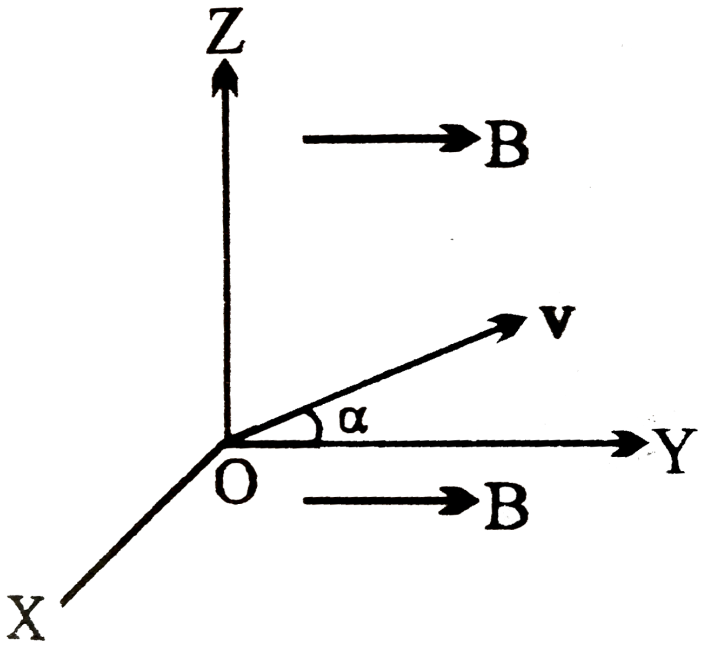
12. In a region of space, a uniform magnetic field B exists in the y-direction A proton is fired from the origin, with its initial velocity v making a small angle alpha with the y-direction in the yz plane. In the subsequent motion of the proton



A. its x-coordinate can never be positive

B. its x- and z-coordinates cannot both be zero at the same time

C. its z-coordinate can never be negative

D. its y-coodinate will be proportional to the squuare time of flight

Answer: A

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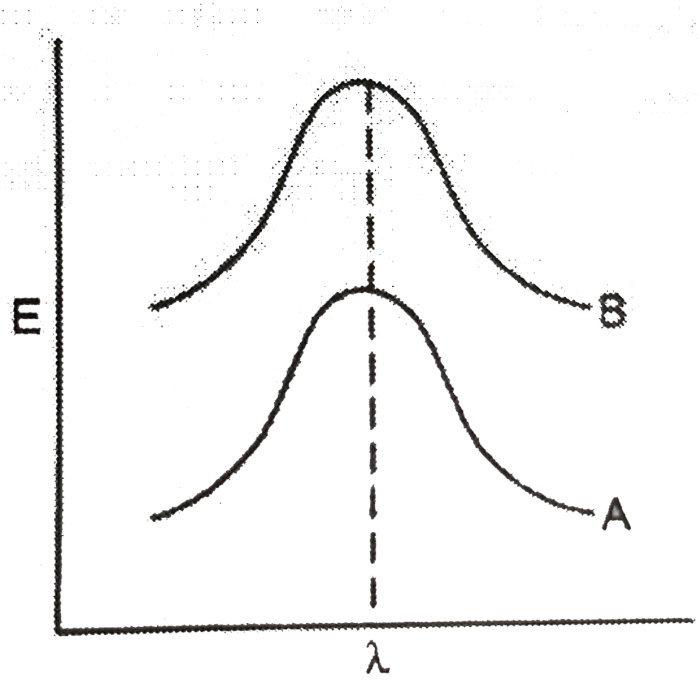

13. Two bodies A and B have the same surface area and mass the bodies have absolute temperatures$T_A \text{ and } T_B$ emissivities e_a and e_b and specific heat capacities s_A and s_B. The intensity, E , of radiation near a given

wavelength is shown plotted against the wavelength λ, of radiation for both the bodies. Which of the following is possible?

A. $T_A = T_B, e_A = e_B, s_A \neq s_B$

B. $T_A = T_B, e_A \neq e_B, s_A = s_B$

C. $T_A \neq T_B, e_A = e_B, s_A = s_B$

D. $T_A \neq T_B, e_A = e_B, s_A \neq s_B$

Answer: B

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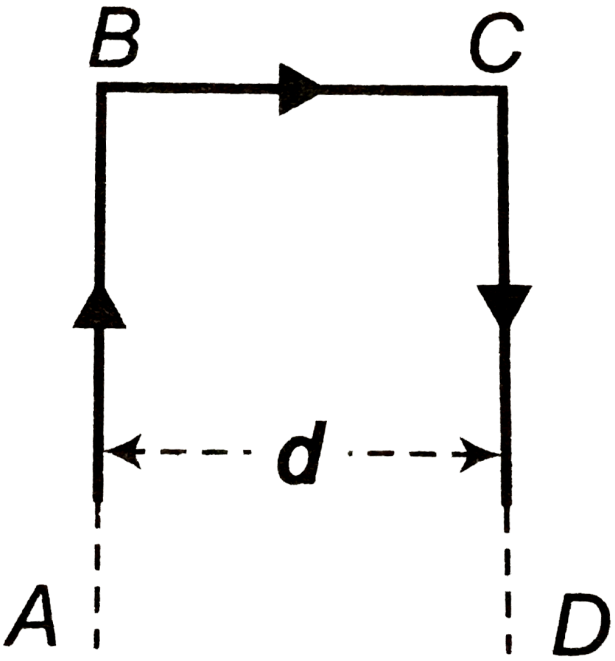
14. AB and CD are long staright conductors, distance d apart, carrying a current I. The magnetic field on BC due to the currents in AB and CD



A. $P \propto t$

B. $P \propto \frac{1}{t}$

C. $P \propto \frac{1}{\sqrt{1}}$

D. P is independent of t.

Answer: B

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15. One cubic meter of an ideal gas ia at a pressure at $10^5 N/m^2$ and temperature 300K. The gas is allowed to expand at constant pressure to twice its volume by supplying

heat. If the change in internal energy in this process is $10^4 J$, then the heat supplied is

A. 10^{15} atm

B. 10^{-10} atm

C. 10^{-5} atm

D. 1 atm

Answer: A

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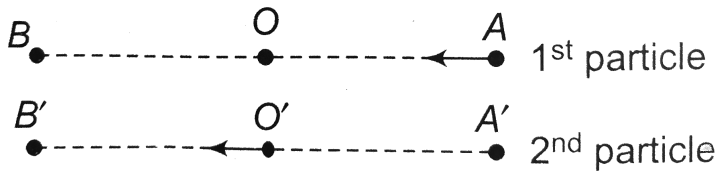
16. Two particle undergoes SHM along parallel line with the same time period (T) and equal amplitude At a particular instant , one particle is at its extereme position while the other is at its mean position .They move in the same direction .They will cross each other after a further time



A. T/8

B. 3T/8

C. T/6

D. 4T/3

Answer: B

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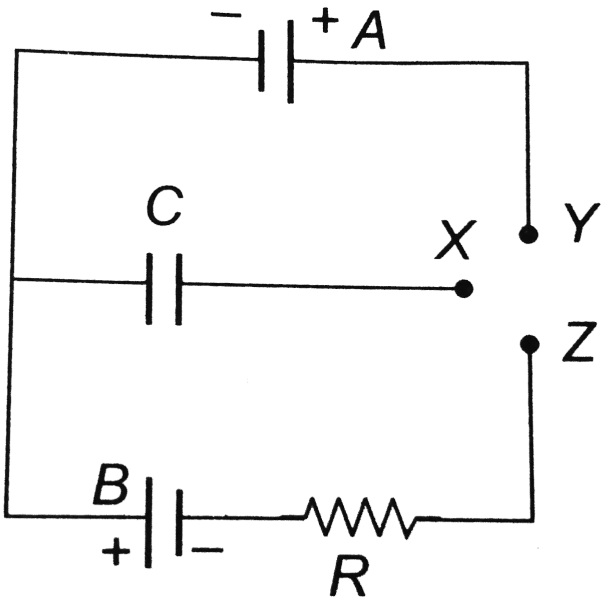
17. In the circuit shown the cells are ideal and of equal emfs, the capacitance of the capacitor is C and the resistance of the resistor is R. X is first joined to Y and then to Z. After a long time, the total heat produced in the resistor

will be



A. equal to the energy finally stored in the capacitor

B. half the energy finally stored in the capacitor

C. twice the energy finally stored in the capacitor

D. Four times the energy finally stored in the capacitor

Answer: D

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Assertion Reason Type

1. STATEMENT-1: Real images cannot be formed by reflection of light in a convex mirror.

STATEMENT-2: Parallel rays incident on a convex mirror must diverge after reflection.

A. Statement-1 is True , Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True , Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True , Statement-2 is False.

D. Statement-1 is False , Statement-2 is True.

Answer: C

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2. A tuning fork sounded together with a tuning fork of frequency 256 emits two beats. On loading the tuning fork of frequency 256,

the number of beats heard are 1 per second. The frequency of tuning fork is

A. Statement-1 is True , Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True , Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True , Statement-2 is False.

D. Statement-1 is False , Statement-2 is True.

Answer: D

3. The Doppler effect is a wave characteristic. Light and sound are both wave motion. Is there any difference in the Doppler effect in light and sound?

A. Statement-1 is True , Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True , Statement-2 is True, Statement-2 is not a correct explanation for Statement-1.

C. Statement-1 is True , Statement-2 is False.

D. Statement-1 is False , Statement-2 is True.

Answer: C

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Linked Comprehension Type

1. This section contains a paragraph. Based upon this paragraph, three multiple- choice question (21-23) have to be answered. Each question has four choices (a,b,c and d), out of which only one is correct.

The result obtained in electrostatics using

Gauss's law can in same cases be used to obtain result in gravitational, and vice versa. This is because both follow the inverse- square law of distance. We use of the following three rules

(1) For charge in electrostatics, the corresponding quantity in gravitation is mass.

(2) Electric intensity of electrostatics corresponds to gravitational intensity, or acceleration due to gravity, in gravitation.

(3)The constant $k = (4\pi\varepsilon_0)^{-1}$ of electrostatics corresponds to -G in gravitation. The gravitation intensity near a thin infinite

sheet wiht mass σ per unit area has the magnitude

A. $4\pi G\sigma$

B. $(1/4\pi)G\sigma$

C. $2\pi G\sigma$

D. $2\pi\sigma/G$

Answer: C

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2. This section contains a paragraph. Based upon this paragraph, three multiple- choice question (21-23) have to be answered. Each question has four choices (a,b,c and d), out of which only one is correct.

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corresponding quantity in gravitation is mass.

(2) Electric intensity of electrostatics corresponds to gravitational intensity, or acceleration due to gravity, in gravitation.

(3)The constant $k = (4\pi\varepsilon_0)^{-1}$ of electrostatics corresponds to -G in gravitation. The gravitational intensity at a distance r from a long thread having λ mass per unit length has the magnitude

A. $\lambda G / r$

B. $2\lambda G / r$

C. $\lambda G / 2r$

D. $\lambda G / 2\pi r$

Answer: A

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3. This section contains a paragraph. Based upon this paragraph, three multiple- choice question (21-23) have to be answered. Each question has four choices (a,b,c and d), out of which only one is correct.

The result obtained in electrostatics using

Gauss's law can in same cases be used to obtain result in gravitational, and vice versa. This is because both follow the inverse- square law of distance. We use of the following three rules

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(3)The constant $k = (4\pi\varepsilon_0)^{-1}$ of electrostatics corresponds to -G in gravitation. The acceleration dut to gravity at the surface

of the earth is g, and at a distance r from the centre of the earth is gr/R, where R is the radius of the earth. Inside a uniformly charged sphere of radius R and charge Q, the electric intensity at a distance r $(r < R)$ from the centre has the magnitude

A. $kQ\left\{1-(r/R)^2\right\}$

B. kQr/R^3

C. kQR/r^3

D. $kQ(R-r)/R^3$

Answer: B

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Matrix Matching Type

1. A beam of white light is incident on glass air interface from glass to air such that green light just suffers total internal reflection. The colors of the light which will come out to air are

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