PHYSICS

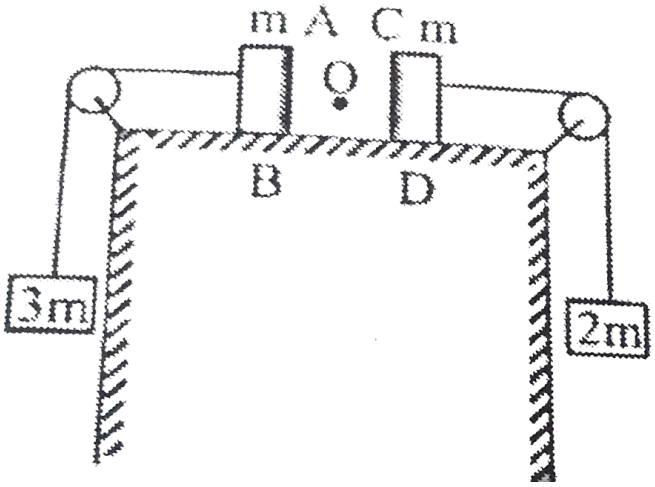
BOOKS - CAREER POINT

UNIT TEST 9

Physics

1. Two blocks each of mass m lie on a smooth table. They are attached to two other masses as shown in the figure. The pulleys and strings

are light. An object O is kept at rest on the table. The sides AB & CD of the two blocks are made reflecting. The acceleration of two images formed in those two reflecting surfaces w.r.t. each other is:



A. $5g/6$

B. $5g/3$

C. $g/3$

D. $17g/6$

Answer: B

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2. An object is approaching a fixed plane mirror with velocity $5ms^{-1}$ making an angle of 45° with the normal. The speed of image w.r.t. the mirror is

A. $5m/s$

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

C. $5\sqrt{2}m/s$

D. $10m/s$

Answer: C

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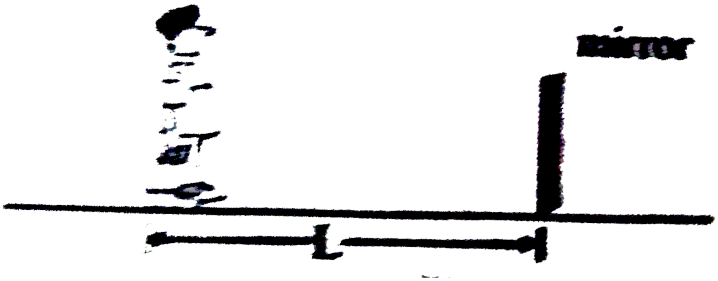
3. A boy of height H is standing in front of a mirror, which has been fixed on the ground as shown in figure. What length of his body can

the man see in the mirror? The length of the mirror is $(H/2)$.



A. H

B. $H^2/\left(H^2+L^2\right)^{1/2}$

C. Zero

D. $2H^2/L$

Answer: C

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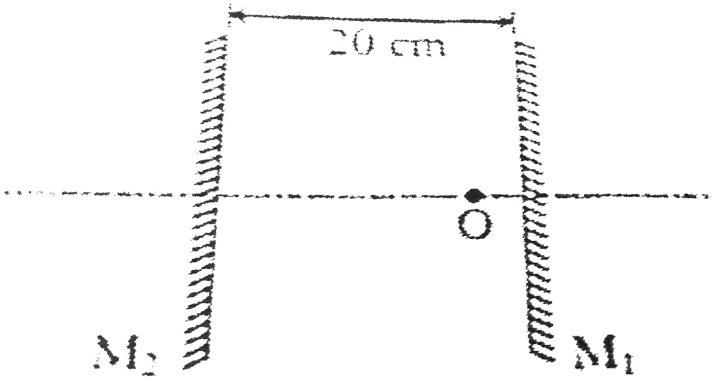
4. Two plane mirror M_1 and M_2 are placed parallel to each other 20 cm apart. A luminous point object 'O' is placed between them at 5 cm from M_1 as shown in figure-



(a) The distances (in cm) of first three nearest images from mirror M_1 are 5,35 and 45 respectively

(b) The distances (in cm) of first three nearest images from mirror M_2 are 5,35 and 45 respectively

(c) The distances (in cm) of first three nearest images from mirror M_1 are 15,25 and 55 respectively.

(d) The distances (in cm) of first three nearest images from mirror M_2 are 15,25 and 55 respectively

A. a,b

B. b,c

C. a,d

D. c,d

Answer: C

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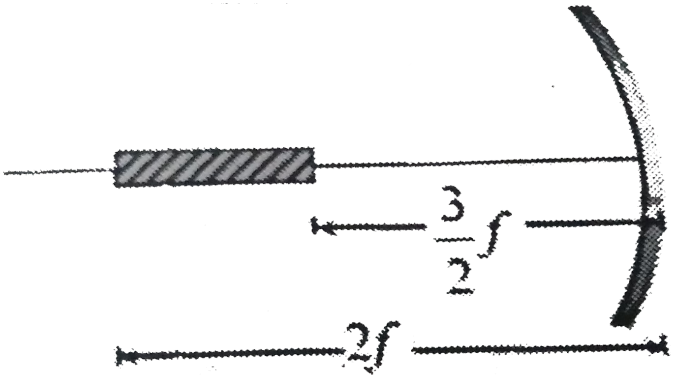
5. A linear object is placed along the axis of a mirror as shown in figure. If 'f' is the focal length of the mirror then the length of image

is-



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

B. f

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

D. None of these

Answer: B

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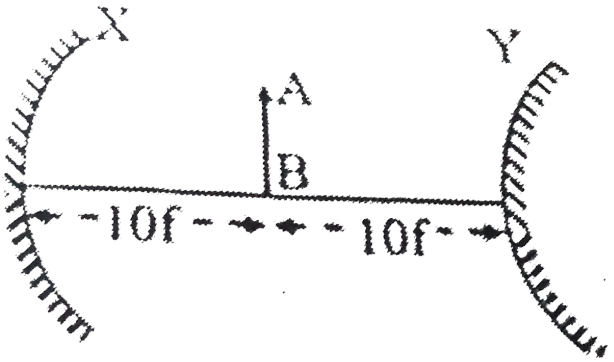
6. Concave mirror and convex mirror having equal focal lengths 2f are placed on same principal axis. If the object AB is placed between these mirros, find the height ratio of the images of this object on two mirrors $H_x / H_y = ?$



A. $1/2$

B. $3/2$

C. $4/3$

D. $1/1$

Answer: B

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7. An infinitely long rod lies along the axis of a concave mirror of focal length f. The near end of the rod is distance $u > f$ from the mirror. Its image will have length

A. $\frac{f^2}{u-f}$

B. $\frac{uf}{u-f}$

C. $\frac{f^2}{u+f}$

D. $\frac{uf}{u+f}$

Answer: A

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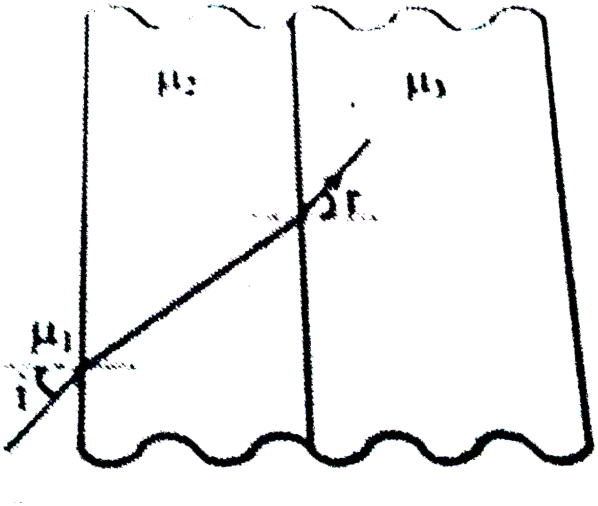
8. In the figure shown $\frac{\sin i}{\sin r}$ is equal to:



A. $\frac{\mu_2^2}{\mu_3 \mu_1}$

B. $\frac{\mu_3}{\mu_1}$

C. $\frac{\mu_3 \mu_1}{\mu_2^2}$

D. None of the above

Answer: B

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9. The refracting angle of a prism is A and refractive index of the material of prism is $\cot(A/2)$. The angle of minimum deviation will be

A. $180^\circ - 3A$

B. $180^\circ + 2A$

C. $90^\circ - A$

D. $180^\circ - 2A$

Answer: D

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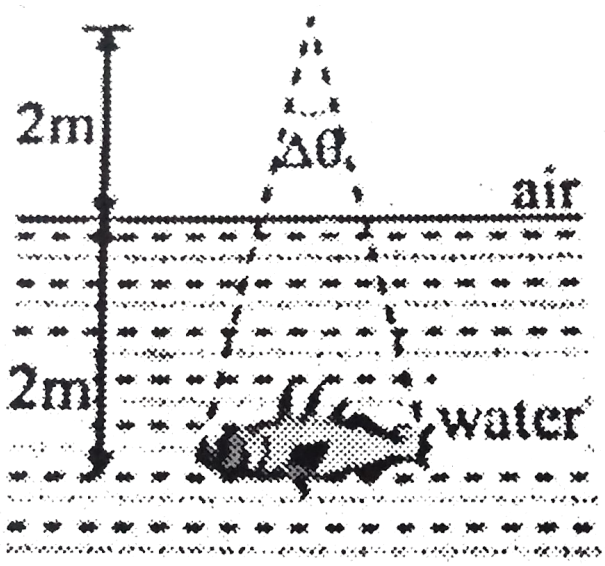
10. A man looks down on a fish of length 20 cm. His eye is 2m above the surface of the water $(\mu = 4/3)$ and the fish is 2m below the surface as shown in the figure the ratio of angular width $\Delta\theta$ of the fish as seen by the man in presence of water to the $\Delta\theta$ in the

absence of water is ($\Delta\theta$ is small)



A. $\frac{6}{5}$

B. $5/6$

C. $7/8$

D. $8/7$

Answer: D

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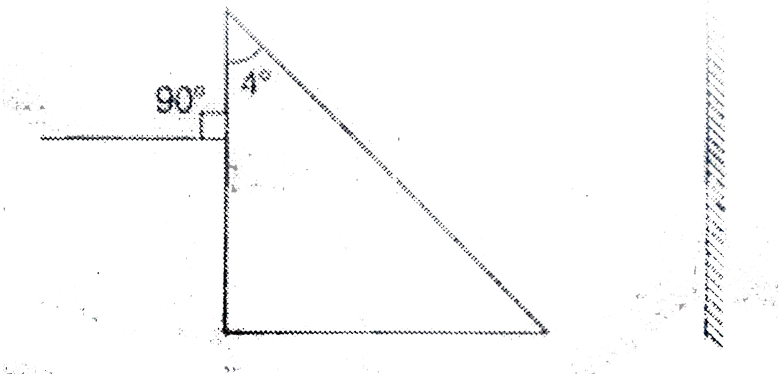
11. A prism having an apex angle 4° and refractive index 1.5 is located in front of a vertical plane mirror as shown in figure. Through what total angle is the ray is deviated

after reflection from the mirror ?



A. 176°

B. 4°

C. 178°

D. 2°

Answer: C

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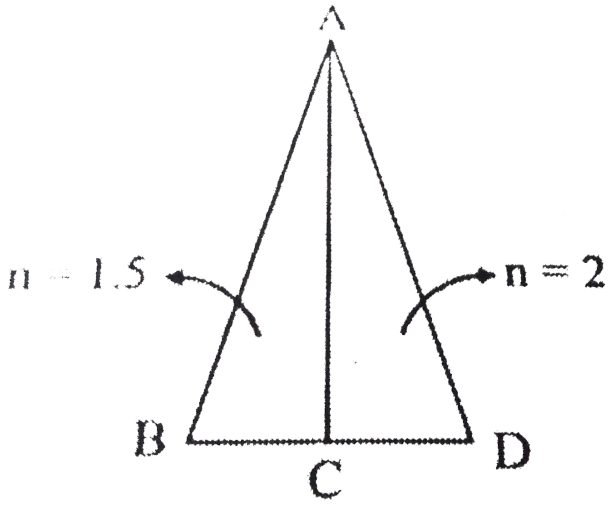
12. A ray of light is incident on a prism as shown in fig. Find the total deviation suffered by the ray if $\angle BAC = 1^\circ$ and $\angle CAD = 2^\circ$.



A. 1°

B. 1.5°

C. 2.5°

D. 2°

Answer: C

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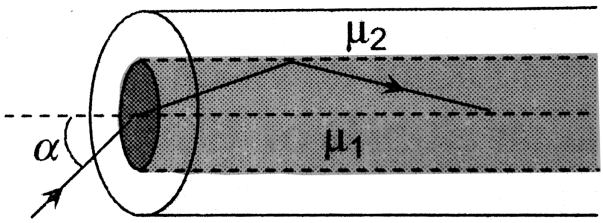
13. An optical fibre consists of core of μ_1 surrounded by a cladding of $\mu_2 < \mu_1$. A beam of light enters from air at an angle α with axis of fibre. The highest α for which ray can be

travelled through fibre is



A. $\cos^{-1}\sqrt{\mu_2^2 - \mu_1^2}$

B. $\sin^{-1}\sqrt{\mu_1^2 - \mu_2^2}$

C. $\tan^{-1}\sqrt{\mu_1^2 - \mu_2^2}$

D. $\sec^{-1}\sqrt{\mu_1^2 - \mu_2^2}$

Answer: B

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14. Two identical glass $\left(\mu_g = 3/2\right)$ equiconvex lenses of focal length f are kept in contact. The space between the two lenses is filled with water $\left(\mu_w = 4/3\right)$. The focal length of the combination is

A. f

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

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

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

Answer: D

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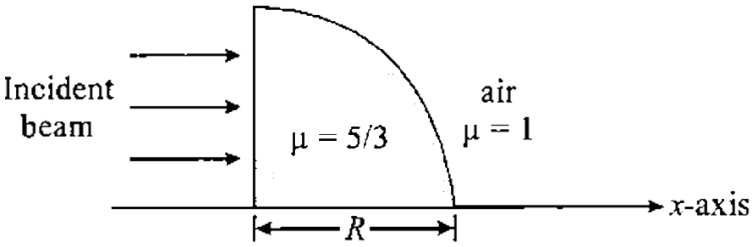
15. A uniform, horizontal parallel beam of light is incident upon a prism as shown. The prism is in the shape of a quarter cylinder, of radius 5cm, and has refractive index 5/3. The width of the regionat which the incident rays after normal incidence on plane surface and subsequent refraction at curved surface intersect on x axis is (Neglect the ray which

travels along x-axis)



A. $4cm$

B. $5/4cm$

C. $9/4cm$

D. $25/4cm$

Answer: D

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16. Two thin lens have a combined power of 10D in contact. When separated by 20 cm their equivalent power is $6.25D$. Find teir in dividual powers in dioptres-

A. 3.5 and 6.5

B. 5 and 5

C. 7.5 and 2.5

D. 9 and 1

Answer: C

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17. A beam of plane polarized light falls normally on a polarizer of cross sectional area $3 \times 10^{-4} m^2$. Flux of energy of incident ray in $10^{-3} W$. The polarizer rotates with an angular frequency of $31.4 rad/\sec$. The energy of light passing through the polarizer per revolution will be

A. 10^{-4} Joule

B. 10^{-3} Joule

C. 10^{-2} Joule

D. 10^{-1} Joule

Answer: A

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18. A screen is placed 50cm from a single slit, which is illuminated with 6000Å light. If distance between the first and third minima in the diffraction pattern is 3.0 mm, what is the width of the slit?

A. $0.1mm$

B. $0.2mm$

C. $0.3mm$

D. $0.4mm$

Answer: B

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19. A slit of width is illuminated by white light. For red light $(\lambda = 6500\text{Å})$, the first minima is obtained at $\theta = 30^\circ$. Then the value of will be

A. $3250Å$

B. $6.5 \times 10^{-4} cm$

C. 1.3 micron

D. $2.6 \times 10^{-4} cm$

Answer: C

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20. A beam of light AO is incident a glass slab $(\mu = 1.54)$ in the direction show. The reflected ray OB is passed through a Nicol

prism. On viewing through a Nicol prism, we find on rotating the prism that

A. the intensity is reduced to zero and remains zero

B. the intensity reduces down somewhat and rises again

C. there is no change in intensity

D. intensity gradually reduces to zero and then again increases

Answer: D

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21. Magnification produced by astronominal telescope for normal adjustment is 10 and length of telescope is 1.1m. The magnification when the image is formed at least distance of distinct vision $(D = 25cm)$ is-

A. 14

B. 6

C. 16

D. 18

Answer: A

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22. In a compound microscope, the focal lengths of two lenses are $1.5cm$ and $6.25cm$ an object is placed at $2cm$ form objective and the final image is formed at $25cm$ from eye lens. The distance between the two lenses is

A. $6.00cm$

B. $7.75cm$

C. $9.25cm$

D. $11.00cm$

Answer: D

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23. A telescope of diameter $2m$ uses light of wavelength $5000Å$ for viewing stars.The minimum angular separation between two

stars whose is image just resolved by this telescope is

A. $4 \times 10^{-4} rad$

B. $0.25 \times 10^{-6} rad$

C. $0.31 \times 10^{-6} rad$

D. $5 \times 10^{-3} rad$

Answer: C

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24. In a Young's double-slit experiment, let S_1 and S_2 be the two slits, and C be the centre of the screen. If $\angle S_1 C S_2 = \theta$ and λ is wavelength, the fringe width will be

A. $\frac{\lambda}{\theta}$

B. $\lambda\theta$

C. $\frac{2\lambda}{\theta}$

D. $\frac{\lambda}{2\theta}$

Answer: A

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25. In Young's double-slit experiment, the intensity of light in front of one of the slits on a screen is $I_0/2$ where I_0 is the maximum intensity. The distance between the slits is 5λ where λ is the wavelength of monochromatic light. How far away is the screen from the slit?

A. 20λ

B. 25λ

C. 40λ

D. 50λ

Answer: D

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26. In Young's double slit experiment, the intensity of light at a point on the screen where path difference is λ is I. If intensity at another point is I/4, then possible path differences at this point are

A. $\lambda/2, \lambda/3$

B. $\lambda/3, 2\lambda/3$

C. $\lambda/3, \lambda/4$

D. $2\lambda/3, \lambda/4$

Answer: B

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27. In the ideal double-slit experiment, when a glass-plate(refractive index 1.5) of thickness t is introduced in the path of one of the interfering beams (wave-length λ), the

intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass-plate is

A. 2λ

B. $2\lambda/3$

C. $\lambda/3$

D. λ

Answer: A

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28. If ratio of maximum to minimum intensity in an interference experiment is 16:1 then ratio of amplitudes of individual waves is-

A. $4:1$

B. $16:1$

C. $5:3$

D. $25:9$

Answer: C

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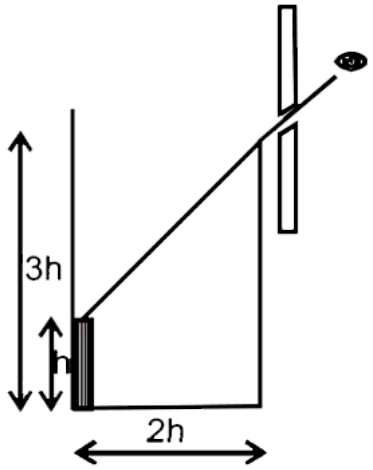
29. An observer can see through a pin-hole the top end of a thin rod of height h, placed as shown in the figure. The beaker height is 3h and its radius h. When the beaker is filled with a liquid up to a height 2h, he can see the lower end of the rod. Then the refractive index of the liquid is



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

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

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

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

Answer: B

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30. If white light traveling in air incidents over glass and undergoes refraction then which colour light deviates maximum-

A. Red

B. Yellow

C. Violet

D. All colours deviates by same angle

Answer: A

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