PHYSICS

BOOKS - MARVEL PHYSICS (HINGLISH)

RAY OPTICS (MIRRORS, LENSES AND OPTICAL INSTRUMENTS)

Multiple Choice Questions

1. A ray of light on a plane mirror at an angle of 60°. What is the deviation produced by the

mirror ?

A. 120°

B. 60°

C. 30°

D. 90°

Answer: B

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2. A plane mirror produces a magnification of

A. $+1$

B. -1

C. zero

D. between 0 & 1

Answer: A

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3. A student of height 1.9 m can see his full image in a plane mirror fixed on a wall. His eyes are 1.85 m from the floor level. What is

the minimum length of the plane mirror required to get the full image of the student ?

A. 0.85 m

B. 0.75 m

C. 0.95 m

D. 0.8 m

Answer: C

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4. A ray of light is incident on a plane mirror at an angle of 20° with the normal, at the point of incidence, Through what angle, the ray of light will be deviated from its direction of incidence ?

A. 20°

B. 40°

C. 90°

D. 140°

Answer: D

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5. Two plane mirrors are inclined at an angle of 60°. An object is placed between the mirrors. The number of images formed by the two mirrors is

A. 4

B. 6

C. 5

D. 7

Answer: C

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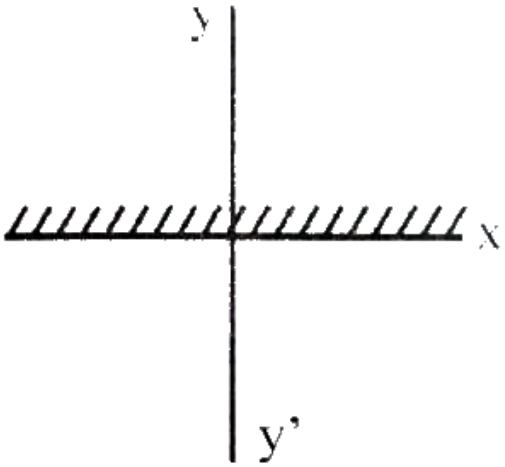
6. A plane mirror is placed along the x-axis facing negative y-axis. The mirror is fixed. An object is moving with a velocity of $3\hat{i} + 4\hat{j}$ in front of the plane mirror. The relative velocity

of image with respect to the object is



A. $-8\hat{j}$

B. $8\hat{j}$

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

D. $-6\hat{i}$

Answer: A

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7. Which mirror should be used to obtain a parallel beam of light from a small lamp, placed in front of the mirror ?

A. convex

B. plane

C. concave

D. any one of the above

Answer: C

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8. An object is placed at a distance of 30 cm from the pole of a curved (convex or concave) mirror of focal length 15 cm. Then the linear magnification is

A. one for both types of mirrors

B. one only for a convex mirror

C. one only for a concave mirror

D. $\frac{1}{3}$ for a concave mirror

Answer: C

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9. An object is placed at 50 cm in front of a concave mirror of focal length 25 cm. What is the nature of the image produced by the mirror ?

A. real and erect and of the same size

B. virtual and inverted and bigger in size

C. real, inverted and of the same size

D. real, inverted and smaller in size

Answer: C

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10. A concave mirror of focal length 15 cm forms an image having twice the linear dimensions of the object. The position of the object when the image is virtual will be

A. 45 cm

B. 35 cm

C. 25 cm

D. 7.5 cm

Answer: D

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11. A boy stands straight in front of a mirror at a distance of 30 cm from it. He sees his erect image whose height is $\frac{1}{5}$ of his real height. The mirror he is using is

A. Plane

B. Convex

C. Concave

D. Plano-convex

Answer: B

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12. A 4.5 cm object is placed perpendicular to the axis of a convex mirror of focal length 15

cm at a distance of 12 cm. The size of the image is

A. 6.0 cm

B. 4.5 cm

C. 3.0 cm

D. 2.5 cm

Answer: D

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13. What is the distance of an object from a concave mirror of focal length 20 cm so that the size of the real image is three times the size of the object ?

A. 40 cm

B. 60 cm

C. 26.67 cm

D. 6.67 cm

Answer: C

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14. A spherical mirrorr forms an image of magnification 3. The object distance, if focal length of mirrorr is $24cm$, may be

A. 24 cm

B. 16 cm

C. 32 cm only

D. 16 cm only

Answer: B

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15. Image of an object approaching a convex mirror of radius of curvature 20m slong its optical axis is observed to move from $\frac{25}{3}$m to $\frac{50}{7}$m in 30 seconds. What is the speed of the object in km per hour?

A. 5 km/h

B. 4 km/h

C. 3 km/h

D. 2 km/h

Answer: C

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16. A candle flame 3 cm high is placed at a distance of 3m from a wall. How far from the wall must a concave mirror be placed so that it may form 9 cm high image of the flame on the same wall ? Also find the focal length of the mirror.

A. 225 cm

B. 300 cm

C. 450 cm

D. 150 cm

Answer: C

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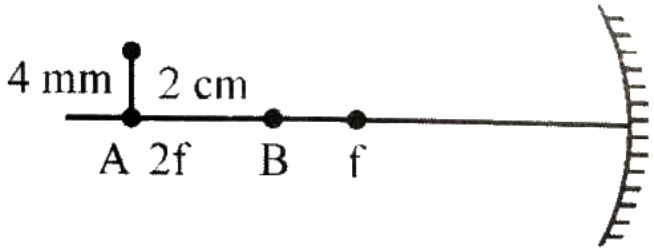
17. The focal length of a concave mirror is 10 cm. An L- shaped object is placed in front of the mirror as shown. The dimension of L along the horizontal is 2 cm and along the vertical is

4 mm. What is the magnification of the image along the axis ?



A. 2

B. 1.75

C. 1.25

D. 1.5

Answer: C

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18. The focal length of convex lens is 30 cm and the size of image is quarter of the object, then the object distance is

A. 90 cm

B. 60 cm

C. 30 cm

D. 50 cm

Answer: A

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19. Focal length of convex lens will miximum for

A. Red light

B. Blue light

C. Yellow light

D. Violet light

Answer: A

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20. An air lens having $R_1 = R_2 = 10$ cm is cut in a glass slab of $\mu = 1.5$. What is the focal length and the nature of the lens ?

- 0, concave
- ∞, convex
- 15 cm, concave
- 15 cm, convex

Answer: C

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21. A concave lens having a material of refractive index μ_1 is kept in a medium of R.I. μ_2, where $\mu_1 < \mu_2$. A parallel beam of light is incident on the lens. The concave lens will act as

A. a diverging lens

B. a converging lens

C. a plane glass slab

D. a plano concave lens

Answer: B

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22. A luminous point object is placed at a distance of 20 cm, from the pole of a convex spherical surface of glass. The radius of the curvature of the convex surface is 25 cm and the R.I. of the glass is 1.5. What is the distance of the image from its pole ?

A. v=20 cm in glass

B. v=30 in glass

C. v=30 cm in air

D. v=40 cm in glass

Answer: B

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23. The radii of curvature of the two surface of a double convex glass lens are 10 cm and 20 cm respectively. If the refractive index of glass in 1.5, then its focal length will be

A. 8.5 cm

B. 13.33 cm

C. 20.7 cm

D. 25.2 cm

Answer: B

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24. How far from a convex lens of focal length 20 cm would you place an object to get a real image enlarged three times ?

A. 15.6 cm

B. 20.5 cm

C. 26.66 cm

D. 33.85 cm

Answer: C

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25. An object of height 10 cm is placed at the focus of a concave lens. What is the height of the image ?

A. 5 cm

B. 2.5 cm

C. 7.5 cm

D. 12.5 cm

Answer: A

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26. How far from a convex lens of focal length 20 cm would you place an object to get a virtual image, which is magnified 3 times ?

A. 7.5 cm

B. 10.8 cm

C. 13.33 cm

D. 16.5 cm

Answer: C

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27. A projector lens has a focal length of 10 cm.

It produces a real image of a $2cm \times 2cm$ slide

on a screen 5 metre from the lens. What is the size of the picture on the screen ?

A. $49cm \times 49cm$

B. $24cm \times 24cm$

C. $98cm \times 98cm$

D. $75cm \times 75cm$

Answer: C

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28. If the radii of curvature of the two surfaces of a concave lens are 10 cm and 20 cm respectively and the refractive index is 1.5. What is its focal length ?

A. -10 cm

B. -12 cm

C. -13.33 cm

D. -16.25 cm

Answer: C

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29. The refractive index and the focal length of a plano convex lens are 1.5 and 50 cm respectively. What is the radius of curvature of the curved surface ?

A. 10 cm

B. 15 cm

C. 20 cm

D. 25 cm

Answer: D

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30. The plane faces of two identical planoconvex lenses each having focal length of $40cm$ are pressed against each other to form a usual convex lens. The distance from this lens, at which an object must be placed to obtain a real, inverted image with magnification one is

A. 10 cm

B. 15 cm

C. 20 cm

D. 25 cm

Answer: C

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31. At what distance an object must be placed from a lens of focal length 15 cm to get an inverted image of unit magnification ?

A. 15 cm

B. 20 cm

C. 25 cm

D. 30 cm

Answer: D

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32. A double convex lens whose radii of curvature are R_1 and R_2 forms the image of a point object, placed on its axis. If the lens is

revered, face to face, then the ratio of the distances of the images in the first and second case will be

A. $\frac{R_1}{R_2}$

B. $\frac{R_2}{R_1}$

C. $1:1$

D. $2:1$

Answer: C

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33. An object is placed at a distance of 30 cm from a concave lens of focal length 15 cm. What is the height of the object if the height of the image is 3 cm ?

A. 3 cm

B. 1 cm

C. 6 cm

D. 9 cm

Answer: D

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34. A convex lens is dipped in a liquid whose refractive index is equal to the refractive of the lens. Then its focal length will

A. decrease

B. become zero

C. remain unchanged

D. become infinite

Answer: D

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35. An object placed at 20 cm from a lens, forms an image on a screen placed 60 cm on the other side of the lens. What is the focal length and type of the lens ?

A. 15 cm and convex lens

B. -15 cm and concave lens

C. 18 cm and convex lens

D. -18 cm and concave lens

Answer: A

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36. A long glass rod has a hemispherical end. A narrow beam of light is incident on the spherical end, the beam being parallel to the length of the rod. What is the position of the image formed if the refractive index of glass is 1.5 and the radius of curvature of the spherical surface is 10 cm ?

A. v = 30 cm in air

B. v = 20 cm in air

C. v = 30 cm in glass

D. v = 50 cm in glass

Answer: C

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37. A plano-convex lens is made of glass of refractive index 1.6. the radius of curvature of its curved surface is 30 cm. What is the focal length of the lens ?

A. 50 cm

B. 75 cm

C. 100 cm

D. 150 cm

Answer: A

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38. A convex glass lens of focal length 20 cm and refractive index 1.5 is immersed in water of

R.I. $4/3$. What is the change in its focal length

?

A. 30 cm

B. 40 cm

C. 50 cm

D. 60 cm

Answer: D

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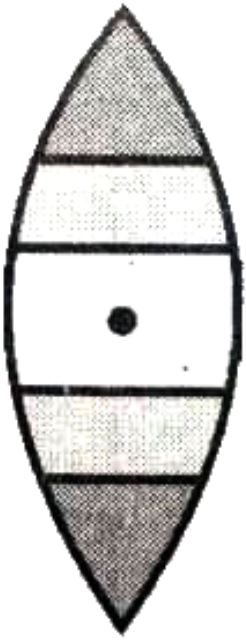
39. A convex lens is made up of three different transparent materials as shown in the figure. How many real images arc formed, if a point object is placed on its principal axis ?



A. 1

B. 2

C. 3

D. 6

Answer: C

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40. Let f_v and f_r are the focal lengths of a convex lens for violet and red lights respectively. If F_v and F_r are the focal lengths

of a concave lens for violet and red light respectively, then

A. $f_V < f_R$ and $F_V > F_R$

B. $f_V < f_R$ and $F_V < F_R$

C. $f_V > f_R$ and $F_V > F_R$

D. $f_V > f_R$ and $F_V < F_R$

Answer: A

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41. A body is located on a wall. Its image of equal size is to be obtained on a parallel wall with the help of a convex leng. The lens is placed at a distance d ahead of second wall, then the required focal length will be:

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

B. Only $\frac{d}{2}$

C. More than $\frac{d}{4}$ but less than $\frac{d}{2}$

D. Less than $\frac{d}{4}$

Answer: B

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42. In displacement method, the lengths of images in the two positions of the lens betwent the object and the screen are 9 cm and 4 cm respectively. The length of the object must be

A. 5 cm

B. 6 cm

C. 12 cm

D. 24 cm

Answer: B

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43. A lens if placed between a source of light and a wall. It forms images of area A_1 and A_2 on the wall for its two different positions. The area of the source or light is

A. $\frac{A_1 + A_2}{2}$

B. $\sqrt{A_1 A_2}$

C. $\sqrt{\left[\frac{\sqrt{A_1}+\sqrt{A_2}}{2}\right]^2}$

D. $\left(\frac{1}{A_1}+\frac{1}{A_2}\right)^{-1}$

Answer: B

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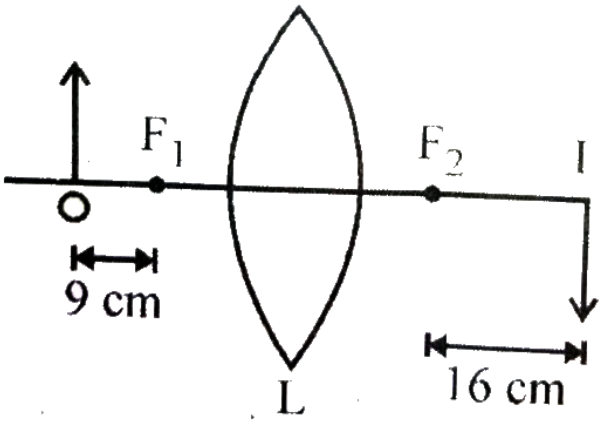
44. The medium on both of a lens is air. The distances of the object O and the image I from first and second foci F_1 and F_2 are 9 cm and

16 cm respectively. What is the focal length of lens ?



A. 16 cm

B. 12 cm

C. 10 cm

D. 20 cm

Answer: B

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45. An index pin of height 3 cm is kept at a distance of 15 cm from a convex lens of focal length 10 cm. The image is obtained on a screen placed on the other side of the lens. What is the height and nature of the image ?

A. 3 cm, erect

B. 6 cm, erect

C. 6 cm, inverted

D. 1.5 cm, inverted

Answer: C

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46. An object is placed in front of convex lens.

If the central portion of a convex lens is

painted black as shown in the figure, then

A. there will be two images, produced by the upper and lower portions of the lens

B. the central portion of the image will be missing

C. no image will be formed by the transparent portion of the lens

D. full image will be formed but it will be of less intensity

Answer: D

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47. The lower half of a convex lens is painted black. If an object is placed in front of the lens, then

A. the lower half of the iamge will disappear

B. the upper half of the image will disappear

C. the intensity of the image will be reduced to half of that due to the ful transparent lens

D. the size of the image will be half the size of the object

Answer: C

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48. The real iamge of a square hole in screen, illuminated be light is obtained on another screen with the help of a converging lens. This distance of the hole from the lens is 20 cm.

the are of the image is nine times that of the hole. What is the focal length of the lens ?

A. 30 cm

B. 25 cm

C. 20 cm

D. 15 cm

Answer: D

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49. An illuminated object and a screen are placed $90cm$ apart. What is the focal length and nature of the lens required to produce a clear image on the screen twice the size of the object ?

A. 10 cm

B. 15 cm

C. 20 cm

D. 30 cm

Answer: C

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50. Focal length of convex lens will miximum for

A. blue light

B. yellow light

C. red light

D. green light

Answer: A

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51. The refractive indices of the material of a lens for violet, yellow and red colours of light are 1.66, 1.64 and 1.62 respectively. The mean focal length of the lens is 10 cm. What is the chromatic aberration of the lens between the violet and the red colours ?

A. 0.857 cm

B. 0.825 cm

C. 0.625 cm

D. 1.0 cm

Answer: C

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52. The image of an illuminated square object is obtained on a screen with the help of a converging lens. The distance of the square from the lens is 30 cm. The area of the image is 9 times of the square. What is the focal length of the ions ?

A. 30 cm

B. 36 cm

C. 22.5 cm

D. 18 cm

Answer: C

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53. A double convex lens of focal length 6 cm is made of glass of refractive index 1.5. The radius of curvature of one surface is double

that of the other surface. The value of smaller radius of curvature is

A. 6 cm

B. 4.5 cm

C. 9 cm

D. 4 cm

Answer: B

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54. What is the refractive index of material of a plano-convex lens , if the radius of curvature of the convex surface is 10 cm and focal length of the lens is 30 cm ?

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

B. $\frac{7}{4}$

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

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

Answer: D

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55. An object is placed at the focus of a concave lens. Where will be image ?

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

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

C. 2f

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

Answer: B

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56. A convex lens has the same radius of curvature (R) for both the surfaces. For what value of the refractive index of the material of the convex lens, the numerical values of f and R are equal ?

A. 1.4

B. 1.5

C. 1.55

D. 1.6

Answer: B

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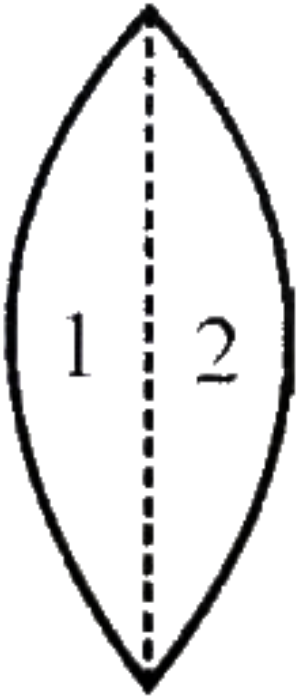
57. An equiconvex lens has a focal length f. It is cut into two equal parts along the dotted line as shown in the figure. What will be the focal

length of each part ?



A. f

B. 2f

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

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

Answer: B

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58. An object is placed at a distance x_1 from the principal focus of a lens and its real image is formed at a distance x_2 from the another principal focus. The focal length of the lens is

A. $\sqrt{x_1 x_2}$

B. $\frac{x_1 x_2}{2}$

C. $\frac{x_1 + x_2}{2}$

D. $x_1 x_2$

Answer: A

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59. When a biconvex lens of glass having refractive index 1.47 is dipped in a liquid, it acts as a plane sheet of glass. This implies that the liquid must have refractive index.

A. equal to the of glass

B. less than one

C. greater than that of glass

D. less than that of glass

Answer: A

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60. A double convex thin lens made of glass (refractive index $\mu = 1.5$) has both radii of curvature of magnitude 20 cm . Incident light

rays parallel to the axis of the lens will converge at a distance L such that

A. d=10 cm

B. d=15 cm

C. d=20 cm

D. d=40 cm

Answer: C

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61. A double convex lens has faces of radii of curvature 30 cm each. The refractive index of the material of the lens is 1.5. What is the focal length of this lens when immersed is carbondisulphide of refractive index 1.6 ?

A. $-120cm$

B. $-180cm$

C. $-200cm$

D. $-240cm$

Answer: D

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62. The radii of curvature of a double concave lens are 30 cm and 45 cm. What is its focal length in water ?

$\left[{}_{a}n_{g} = 1.5, {}_{a}n_{w} = 4/3\right]$

A. $-144cm$

B. $-130cm$

C. $-114cm$

D. $-100cm$

Answer: A

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63. A source of light and a screen are placed 90 cm apart. Where should a convex lens of 20 cm focal length be placed in order to form a real image of the source on the screen ?

A. 30 cm or 60 cm

B. 20 cm or 70 cm

C. 40 cm or 50 cm

D. 35 cm or 65 cm

Answer: A

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64. A convex lens of focal length f produces a virtual image n times the size of the object. Then the distance of the object from the lens is

A. $v = f(m - 1)$

B. $v = f(1 - m)$

C. $v = \frac{f}{m + 1}$

D. $v = f(m + 1)$

Answer: D

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65. An aircraft flying at a altitude of 2000 metre, takes the photographs of the ground by a camera with a lens of focal length 0.5 m. The size of the film in the camera is

$12cm \times 12cm$. What area of the ground can be photographed by this camera at any time ?

A. $240m \times 240m$

B. $300m \times 300m$

C. $400m \times 400m$

D. $480m \times 480m$

Answer: D

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66. If $f(V)$ and f_R are the focal lengths of a concex lens for violet and red light respectively and $F_V$and F_R are the focal lengths of concave lens for violet and red light respectively, then we have

A. $n_R = n_V$

B. $n_R > n_V$

C. $n_R < n_V$

D. $n_R \geq n_V$

Answer: C

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67. Two plano-convex lenses of radii of curvature R and R and refractive index 1.5 will have equivalent focal length equal to R, if they are placed

A. at distance R

B. at distance R/2

C. at distance R/4

D. in contact with each other

Answer: D

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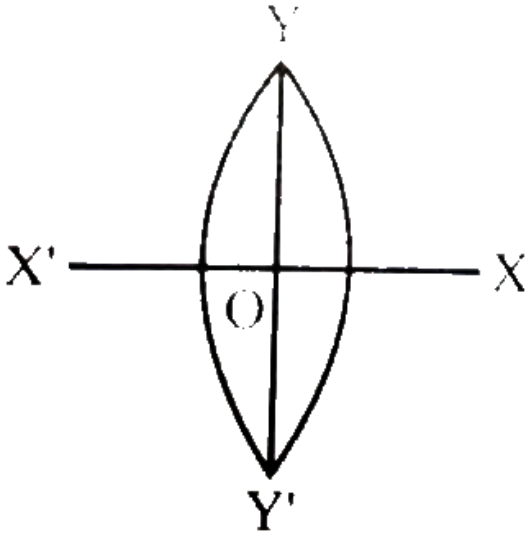
68. An equiconvex lens is cut into two halves along (i) XOX' and (ii) YOY' as shown in the figure. Let f, f, f' be the focal lengths of the complete lens, of each half in case (i), and of each half in case (ii), respectively.



Choose the correct statement from the following.

A. f' = f, f'' = f

B. f' = 2f, f' = 2f

C. f' = f, f'' = 2f

D. f' = 2f, f'' = f

Answer: C

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69. A boy is trying to start a fire by focusing sunlight on a piece of paper using an equiconvex lens of focal length $10cm$. The diameter of the sun is $1.39 \times 10^9 m$ and its mean distance from the earth is $1.5 \times 10^{11} m$. What is the diameter of the sun's image on the paper ?

A. $9.2 \times 10^{-4} m$

B. $3.5 \times 10^{-4} m$

C. $1.2 \times 10^{-3} m$

D. $12.4 \times 10^{-5} m$

Answer: C

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70. A concave lens of glass, refractive index 1.5 has both surfaces of same radius of curvature

R. On immersion in a medium of refractive index 1.75, it will behave as a

A. concave lens of focal length 1.75 R

B. concave lens of focal length 3.5 R

C. convex lens of focal length 2.5 R

D. convex lens of focal length 3.5 R

Answer: D

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71. An object is placed first at infinity and then at 20 cm from the object side focal plane of a convex lens. The two images thus formed are 5 cm apart the focal length of the lens is

A. 5 cm

B. 15 cm

C. 10 cm

D. 25 cm

Answer: C

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72. The magnification of the real images produced by a convex lens varies from one to infinity. What are the values of the distances of the object from the lens for these magnifications ?

A. f and 0

B. ∞ and f

C. 2f and f

D. 2f and 3f

Answer: C

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73. A thin convex lens of focal length f, has its aperture of diameter d. It forms a real iomage of intensity I. The central part of the aperture is blocked by an opaque paper of diameter $\frac{d}{2}$. What is the focal length of the lens and the intensity of image formed by the lens ?

A. $\frac{f}{2}, \frac{I}{2}$

B. $f, \frac{3I}{4}$

C. $\frac{3f}{4}, \frac{1}{2}$

D. $f, \frac{I}{4}$

Answer: B

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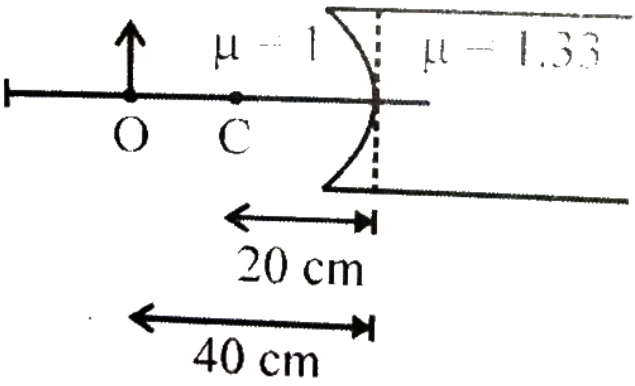
74. For an optical arrangement shown in the figure, what is the position of the image

formed ?



A. 32 cm

B. 0.6 cm

C. 6 cm

D. 0.5 cm

Answer: A

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75. The divergent lens in m linear magnification produced by the lens is

A. m

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

C. $(m+1)$

D. $\frac{1}{m+1}$

Answer: D

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76. An eye specialist prescribes spectacles having combination of convex lens of focal length 40cm in contact with a concave lens of focal length 25cm. The power of this lens combination in diopters is

A. 1.5 D

B. $-2.5D$

C. $-1.5D$

D. $+2.5D$

Answer: C

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77. A convex lens and a concave lens are kept separated by a distance d. If they are placed in close contact, the focal length of the combination

A. will become zero

B. will increase

C. will decrease

D. will remain constant

Answer: C

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78. Two lenses with powers +12D and -2D are kept in close contact with each other. Find the power and the focal length of the combination.

A. 12 cm

B. 10 cm

C. 8 cm

D. 15 cm

Answer: B

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79. A convex lens of focal length 25 cm is kept is contact with a concave lens of focal length 40 cm. What is the power of their combination ?

A. 2.5 D

B. $-2.5D$

C. $+1.5D$

D. $-1.5D$

Answer: C

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80. The focal length of the combination of two thin lenses in contact is 80 cm. If the focal

length of one lens is -20 cm, what is the power of the other lens ?

A. 2.25 D

B. 6.25 D

C. -2.5 D

D. -3.75 D

Answer: B

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81. The radius of curvature of the convex surface of a thin plano-convex lens is 12 cm, and the refractive index of its material is 1.6. What is the power of lens ?

A. 5 D

B. 2 D

C. 3 D

D. 4 D

Answer: A

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82. The focal length of a glass convex lens of refractive index 1.5 is 20 cm. What is the focal power of the lens when immersed in a liquid of refractive index of 1.25 ?

A. 4 D

B. 3 D

C. 2 D

D. 5 D

Answer: C

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83. A convex lens of focal length 80 cm and a concave lens of focal length 50 cm are combined toghether. What will be their resulting power ?

A. $+6.5D$

B. $-6.5D$

C. $+7.5D$

D. $-0.75D$

Answer: D

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84. A convex lens and a concave lens, each having same focal length of $25cm$, are put in contact to form a combination of lenses. The power in diopters of the combination is

A. 25

B. 50

C. Infinite

D. Zero

Answer: D

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85. Two thin convex lenses of focal lengths f_1 and f_2 are in contact and coaxial. The power of the combination is

A. $\sqrt{\frac{f_1}{f_2}}$

B. $\sqrt{\frac{f_2}{f_1}}$

C. $\frac{f_1 + f_2}{2}$

D. $\frac{f_1 + f_2}{f_1 f_2}$

Answer: D

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86. An achromatic combination of lenses is to be made by using a convex and a concave lens.

The two lenses should have

A. equal powers

B. equal refractive indices

C. equal dispersive powers

D. the product of their powers and dispersive powers equal

Answer: D

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87. Two thin lenses of powers 2D and 4D are placed in close contact. An object is placed at a distance of 50 cm from the combination. What is the distance of the image from the combined lens ?

A. 30 cm

B. 40 cm

C. 25 cm

D. 35 cm

Answer: C

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88. A lens of power +3.5D is placed in contact with a lens of power -2.5 D. The combination will behave like

A. a converging lens of focal length 100 cm

B. a diverging lens of focal length 100 cm

C. a converging lens of focal length 200 cm

D. a diverging lens of focal length 200 cm

Answer: A

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89. Two thin lenses of power $+6D$ and $-2D$ are in contact. What is the focal length of the combination ?

A. 0.5 m

B. 0.4 m

C. 0.3 m

D. 0.25 m

Answer: D

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90. A student's near point is 0.5 m and far point is 3m . What are the powers of the spectacle lenses required for (a) reading the books and (b) seeing the distant objects ?

A. $-2D,\ +0.33D$

B. $+2D,\ -0.33D$

C. $-2D,\ +3D$

D. $+2D,\ -3D$

Answer: B

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91. A man suffering from short sight is unable to see objects distinctly at a distance greater than 2 m. The power of lens required to correct this deffect should be

A. 0.50 D

B. $-2D$

C. $-0.50D$

D. $+2D$

Answer: C

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92. The near point of hypermetropic eye is 40 cm . What is the power of the lens used to correct this defect ?

A. 2.5 D

B. 1.5 D

C. $-1.5D$

D. 0.5 D

Answer: A

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93. The real image produced by a convex lens is magnified 4 times. What is the focal power of the lens, if the distance between the object and the image is 50 cm ?

A. 6.5 D

B. 8.5 D

C. 10.5 D

D. 12.5 D

Answer: D

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94. The radii of curvature of both the surfaces of a convex lens are equal. One of the surfaces

is made plane by grinding. What is the new focal power of the lens ?

A. $P' = 2$

B. $P' = \frac{P}{2}$

C. $P' = \sqrt{\frac{P}{2}}$

D. $P' = \frac{2}{3}P$

Answer: B

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95. A convex lens of glass $\left(n = \frac{3}{2}\right)$ has a focal length 20 cm. The lens is immersed in water of refractive index $\frac{4}{3}$. What is the change in the power of convex lens ?

A. 1.75 D

B. 3.75 D

C. 4.5 D

D. 5.75 D

Answer: B

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96. An object kept at a distance of 30 cm from a lens, has its image formed at 20 cm from the lens and on the same side as the object. What is the focal power of the lens ?

A. 1.5 D

B. -1.5 D

C. 1.67 D

D. -1.67 D

Answer: D

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97. A real image is formed by a convex lens. If we put a concave lens in contact with it, the combination again forms a real image. The new image

A. nearer to the lens system

B. at the original position

C. at a larger distance from the lens system

D. anywhere depending on the focal length of the concave lens

Answer: C

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98. The magnifying power of simple microscope can be increased if we use a lens of

A. higher focal length

B. smaller focal length

C. larger diameter

D. smaller diameter

Answer: B

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99. What is the magnifying power of a simple microscope of focal length 5 cm, if the image is formed at the distance of distinct vision ?

A. 4

B. 5

C. 6

D. 7

Answer: C

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100. A simple microscope has a magnifying power of 4.125, when the image is formed at

the distance of distinct vision. What is the focal power of the lens ?

A. 8.5 D

B. 12.5 D

C. 14.5D

D. 10.5D

Answer: B

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101. If tube length of astronomical telescope is 105 cm and magnifying power is 20 for normal setting, calculate the focal length of objective

A. 20 cm

B. 5 cm

C. 100 cm

D. 50 cm

Answer: B

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102. The length of an astronomical telescope is 40 cm. The focal lengths of its lenses will be

A. 35 cm and -5 cm

B. -35 cm and -5 cm

C. 35 cm and +5 cm

D. -35 cm and +5 cm

Answer: C

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103. If the focal length of the ey piece of the telescope is doubled, then its magnifying power (m) will be

A. 2m

B. m

C. m/2

D. 4m

Answer: C

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104. In normal adjustment, the length and magnifying power of an astronomical telescope are 80 cm and 15 respectively. What are the focal lengths of the objective and the eyepiece ?

A. 75 cm, 5 cm

B. 90 cm, 6 cm

C. 60 cm, 4 cm

D. 105 cm, 7 cm

Answer: A

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105. An astronomical telescope consists of two convex lenses of focal lengths 20 cm and 4 cm. For the nomal adjustment of the telescope, what is the angular magnification produced by the telescope ?

A. 4

B. 5

C. 6

D. 2

Answer: B

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106. The focal length of eyepiece of an astronomical telescope is 6 cm. What is the distance between the objective and the eyepiece if it produces a magnification of 10, for normal adjustment ?

A. 36 cm

B. 46 cm

C. 56 cm

D. 66 cm

Answer: D

Watch Video Solution

107. The magnifying power of a telescope is 10. What would be its new magnifying power if the focal length of the objective is doubled and the focal length of the eyepiece is halved ?

A. 20

B. 30

C. 40

D. 50

Answer: C

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108. The magnifying power of the eyepiece of a compound microscope is 6 and the combined magnifying power of the microscope is 84.

What is the magnifying power of the objective

?

A. 10

B. 12

C. 14

D. 16

Answer: C

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109. Four lenses of focal length $+15cm,\ +20cm,\ +150cm$ and $+250cm$ are available for making an astronomical telescope. To produce the largest magnification, the focal length of the eye-piece should be

A. $+15cm$

B. $+20cm$

C. $+150cm$

D. 50 cm

Answer: A

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110. If the red light is replaced by blue light illuminating the object in a microscope the resolving power of the microscope

A. M.P. increases

B. M.P. decreases

C. M.P. does not change

D. May increase or decrease depending upon the intensity of incident light

Answer: A

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111. A compound microscope has an eyepiece of focal length 5 cm and the distance between its objective and the eye piece is 20 cm.

What is the distance of the real intermediate image from the objective, if the final iamge

seen by the eye is formed at the distance of distinct vision ?

A. $\frac{95}{6}$ cm

B. $\frac{85}{6}$ cm

C. $\frac{75}{6}$ cm

D. $\frac{65}{6}$ cm

Answer: A

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112. The focal lengths of the objective and the eyepiece of an astronomical telescope are 40 cm and 5 cm respectively. It is focussed on a scale at a distance of 2 m. The final image is formed at infinity. What is the separation between the two lenses ?

A. 45 cm

B. 50 cm

C. 55 cm

D. 60 cm

Answer: C

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113. An object is seen first in red light and then in violet, yellow and green lights successively through a simple microscope. For which colour the magnifying power of the simple microscope will be maximum ?

A. Green

B. Red

C. Yellow

D. Violet

Answer: D

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114. The focal lengths of the objective and the eyepiece of a compound microscope are 1 cm and 5 cm respectively. An object is placed at a distance of 1.1 cm from the objective. For

getting the final image at infinity, the distance between the two lenses, should be

A. 12 cm

B. 13 cm

C. 14 cm

D. 16 cm

Answer: D

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115. Four convergent lenses have focal lengths $100cm$, $10cm$, $4cm$ and $0.3cm$. For a telescope with maximum possible magnification, we choose the lenses of focal lengths

A. 100 cm, 0.3 cm

B. 100 cm , 10 cm

C. 10 cm, 4 cm

D. 100 cm, 4 cm

Answer: A

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116. A compound microscope produces a magnification of 24. The focal length of the eyepiece is 5 cm. The final image is formed at the least distance of distinct vision. What is the magnification produced by the objective ?

A. 5

B. 6

C. 7

D. 4

Answer: D

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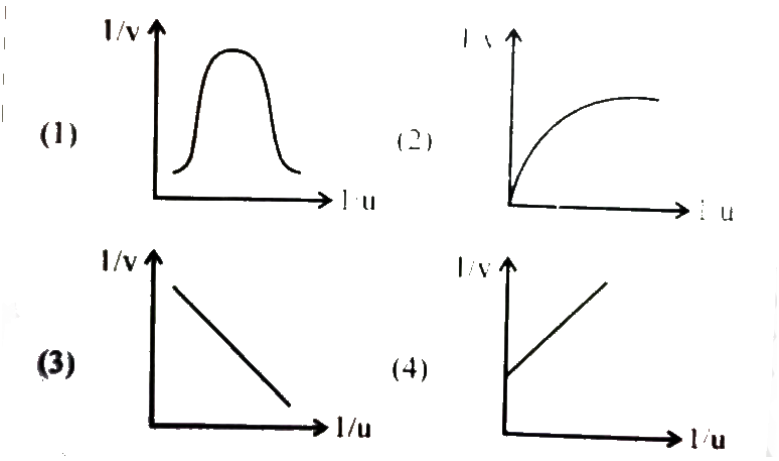
117. For a spherical mirror, the graph of 1/v vs 1/u is



A. Figure 1

B. Figure 2

C. Figure 3

D. Figure 4

Answer: C

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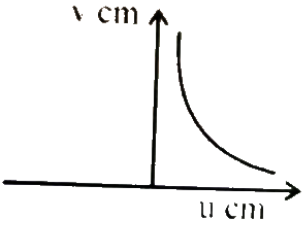
118. A student measured the focal length of a convex lens by finding u and v by using index pins for the object and the image. Which is the correct graph giving the relations between u

and v ?

(1)



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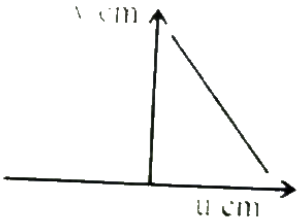

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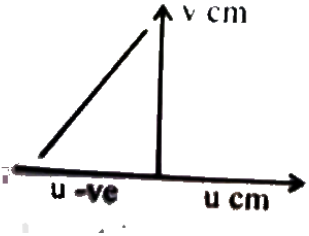

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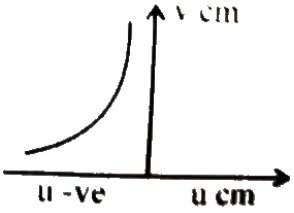

A. 1

B. 2

C. 3

D. 4

Answer: D

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Test Your Grasp

1. To get three images of a single object, one should have two plane mirrors at an angle of

A. 120°

B. 90°

C. 30°

D. 60°

Answer: B

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2. A 4.5 cm object is placed perpendicular to the axis of a convex mirror of focal length 15 cm at a distance of 12 cm. The size of the image is

A. 6.0 cm

B. 4.5 cm

C. 3.0 cm

D. 2.5 cm

Answer: D

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3. A spherical surface of radius of curvature R separates air (refractive index 1.0) from glass (refractive index 1.5). The centre of curvature is in the glass. A point object P placed in air is found to have a real image Q in the glass. The

line PQ cuts the surface at a point O, and $PO = OQ$. The distance PO

A. 5R

B. 3R

C. 2R

D. 1.5R

Answer: A

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4. The real image produced by a convex lens is magnified 4 times. What is the focal power of the lens, if the distance between the object and the image is 50 cm ?

A. 6.5D

B. 8.5D

C. 10.5D

D. 12.5D

Answer: D

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5. Four convergent lenses have focal lengths $100cm$, $10cm$, $4cm$ and $0.3cm$. For a telescope with maximum possible magnification, we choose the lenses of focal lengths

A. 100 cm, 0.3 cm

B. 100 cm, 10 cm

C. 10 cm, 4 cm

D. 100 cm, 4 cm

Answer: A

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6. A concave mirrorr of focal length f_1 is placed at a distance of d from a convex lens of focal length f_2. A beam of light coming from infinity and falling on this convex lens-concave mirrorr combination returns to infinity. The distance d must equal.

A. $f_1 + f_2$

B. $-f_1 + f_2$

C. $2f_1 + f_2$

D. $-2f_1 + f_2$

Answer: C

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7. A astronomical telescope has objective and eyepiece of focal lenghts 40 cm 4 cm respectively. To view an object 200 cm away

from the objective, the lenses must be seperated by a distance

A. 54.0 cm

B. 37.3 cm

C. 46.0 cm

D. 50.0 cm

Answer: A

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8. The magnifying power of the objective of a compound microscope is 6. If the magnifying power of the microscope is 30, then the magnifying power of the eye piece will be

A. 5

B. 6

C. 4

D. 8

Answer: A

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9. Two thin equiconvex lenses each of focal length 0.2 m are placed coaxially with their optic centres 0.5m apart. Then find the focal length of the combination.

A. $-0.4m$

B. 0.4 m

C. -0.1 m

D. 0.1 m

Answer: A

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10. A concave mirror and a convex lens have the same focal length in air. When they are submerged in glycerine, the focal length

A. of both still remains unchanged

B. of the mirror remains unchanged while that of the lens increases

C. of the mirror remains unchanged while that of the lens decreases

D. of both may increase or decrease

Answer: B

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