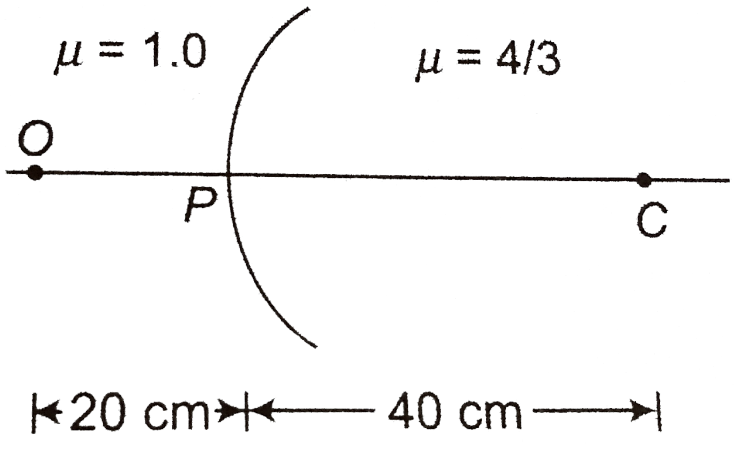
PHYSICS

BOOKS - CP SINGH PHYSICS (HINGLISH)

REFRACTION AT SPHERICAL SURFACES

Example

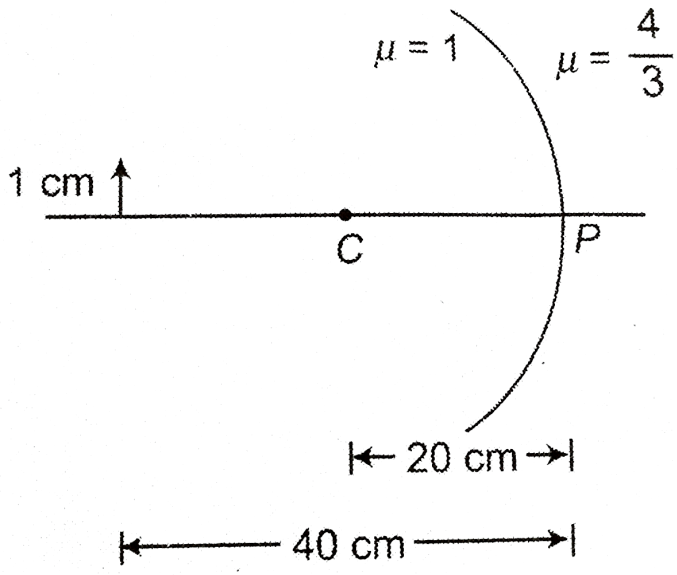


1.

Locate the image of the point object O. The point C is centre of curvature of the spherical surface.

Watch Video Solution

2.

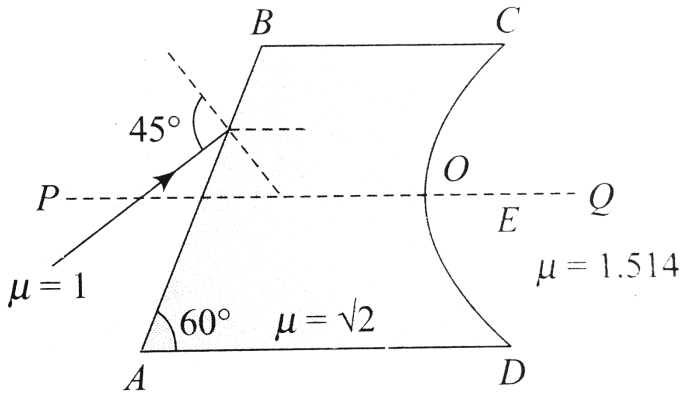


Locate the image and find its height.

Watch Video Solution

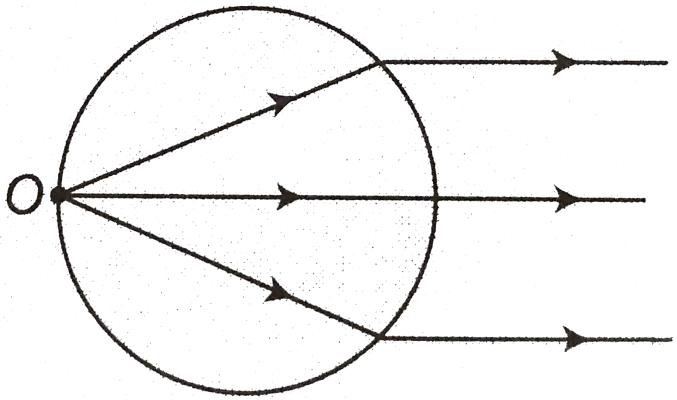
3. Figure shows an irregular block of material of refractive indec $\sqrt{2}$. A ray of light strikes the

face AB as shown. After refraction, it is incident on a spherical surface CD of radius of curvature 0.4 m and enters a medium of refractive index 1.514 to meet PQ at E. Find the distance OE up to two places of decimal.



Watch Video Solution

4.



An object O is stuck on the surface of a transparent solid spher of radius 20 cm. Find refractive index of the sphere such that rays from the object after refraction from the opposite side emerge as a parallel beam, as shown Also prove that refractive index has the same value in the given situation for any value of radius of sphere.

Watch Video Solution

5. A mark of the surface of sphere $\left(\mu = \frac{3}{2}\right)$ is viewed from a diametrically opposite position. It appears to be at a distance 15 cm from its actual position.Find the radius of sphere.

Watch Video Solution

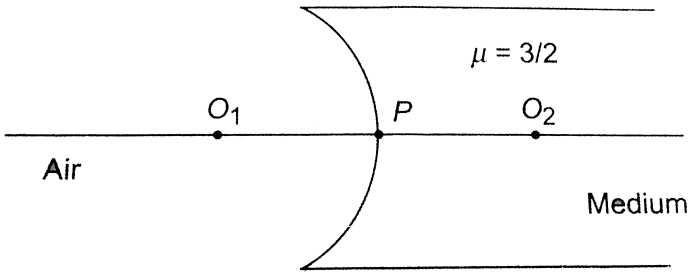
6. A small object stuck on the surface of a glass sphere $(\mu = 4/3)$ is viewed from the diametrically opposite position find transverse magnification.

Watch Video Solution

7. One end of a horizontal cylindrical glass rod $(\mu = 1.5)$ of radius 5.0 cm is rounded in the shape of a hemisphere. Asnobject 0.5 mm high is placed perpendicular to the axis of the rod

at a difference of 20.0 cm from the rounded edge. Locate the image of the object and find its height.

Watch Video Solution



8.

Consider the situation shown in figure. The refractive index of medium is $3/2$ and its radius of curvature is 330 cm

$PO_1 = PO_2 = 10cm$ Find distance O_1 and O_2 and seen by (a) O_1 and (b) O_2

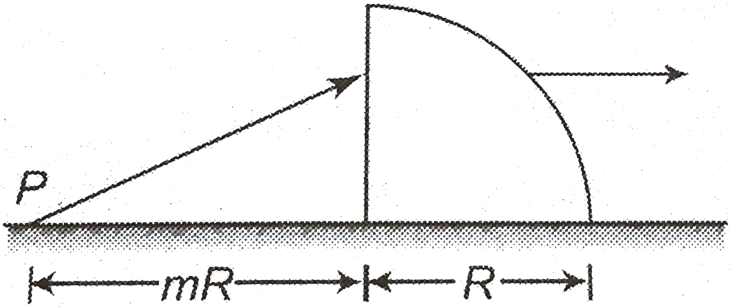
Watch Video Solution

9. An air bubble in glass $(\mu = 3/2)$ is situated at a distance of 2 cm from centre of sphere of diameter 10 cm. Locate the image of bubble from (a) nearer surface and (b) farther surface.

Watch Video Solution

10. Figure shows a transparent hemisphere of radius 3'0 cm made of a material of refractive index 2.0. (a) A narrow beam of parallel rays is incident on the hemisphere as shown in the figure. Are the rays totally reflected at the plane surface ? (b) Find the image formed by the refraction at the first surface. (c) Find the image formed by the reflection or by the refraction at the plane surface. (d) Trace qualitatively the final rays as they come out of the hemisphere.

Watch Video Solution



11.

A quarter cylinder of radius R and refractive index 1.5 is placed on a table.A point object P is kept at a distance of mR from it. Find the value of m for whicha ray from P will emerge parallel to the table as shown in the figure.

Watch Video Solution

12. A parallel bean of light travelling in water (refractie index $= \frac{4}{3}$) is refracted by a spohereical bubble of radius 2 mm situation in water. Assuming the light rays to be paraxial. i. find the position of the image due to refraction at the first surface and the positoin of the final image, and ii draw a ray diagram showing the positions of oth the images.

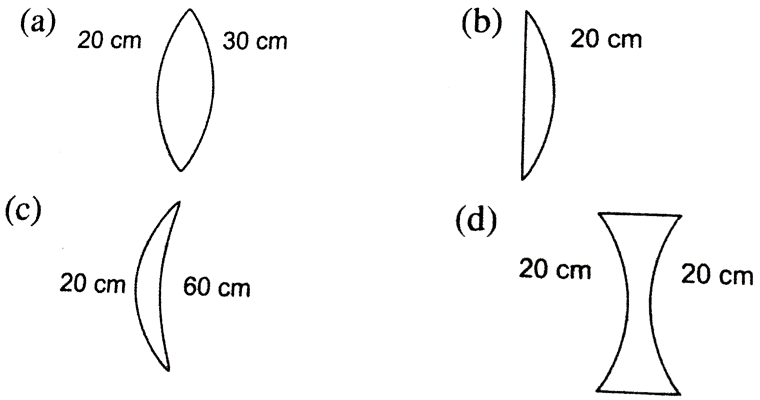
Watch Video Solution

13. A hollow sphere of glass of inner and outer radii R and 2R respectively has a small mark on its inner surface. This mark is observed from a point outside the sphere such that the centre of the sphere lies in between. Prove that the mark will appear nearer than it really it, by a distance $(\mu - 1)(R)/(3\mu - 1)$

Watch Video Solution

14. A hemispherical portion of the surface of a solid glass sphere (mu = 1.5) of radius r is silvered to make the inner side reflecting. An object is placed on the axis of the hemisphere at a distance 3r from the centre of the sphere. The light from the object is refracted at the unsilvered part, then reflected from the silvered part and again refracted at the unsilvered part. Locate the final image formed.

Watch Video Solution



15.

Find focal lengths of lenses made of glass $(\mu = 3/2)$ and placed in air.

Watch Video Solution

16. Lenses are constructed by a material of refractive indices 1'50. The magnitude of the radii of curvature are 20 cm and 30 cm. Find

the focal lengths of the possible lenses with the above specifications.

Watch Video Solution

17. The radii of curvature fo a lens are $+20cm$ and $+30cm$. The material of lens has refractive index $\mu = (3)/(2)$. Find fcal length of lens in air.

Watch Video Solution

18. If in a planoconvex lens, the radius of curvature of the convex surface is $10cm$ and the focal length is $30cm$, the refractive index of the material of the lens will be

Watch Video Solution

19. A thin lens of focal length + 12 cm is immersed in water $(\mu = 1.33)$. What is its new focal length ?

Watch Video Solution

20. Diameter of a plano-convex lens is 6cm and thickness at the centre is 3mm. If speed of light in material of lens is $2 \times 10^8 \frac{m}{s}$, The focal length of the lens is

Watch Video Solution

21. A spherical air lens of radii $R_1 = R_2 = 10cm$

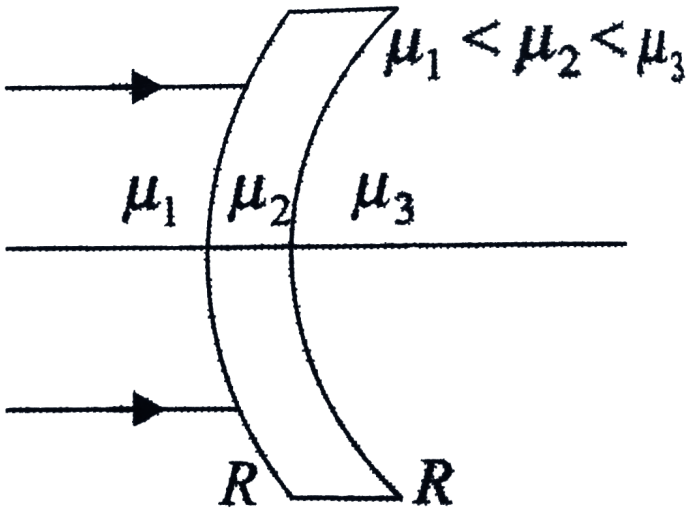
Is cut in a glass $(\mu = 1.5)$ cylinder. Determine the focal length and nature of air lens. If a

liquid of refractive index 2 is filled in the lens, what will happen to its focal length and nature?

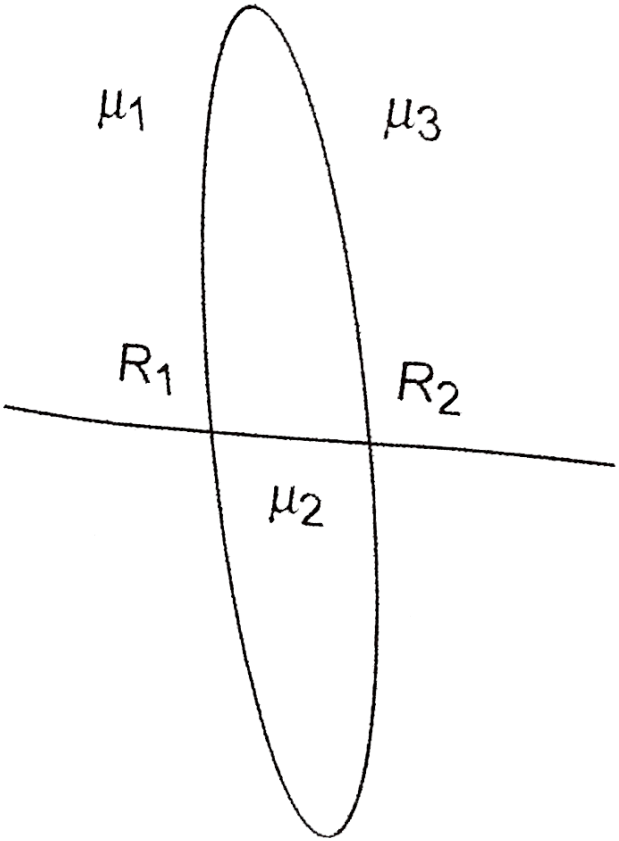
Watch Video Solution

22. Find the focal length of the lens shown in Fig . The radii of curvature of both the

surfaces are equal to R.



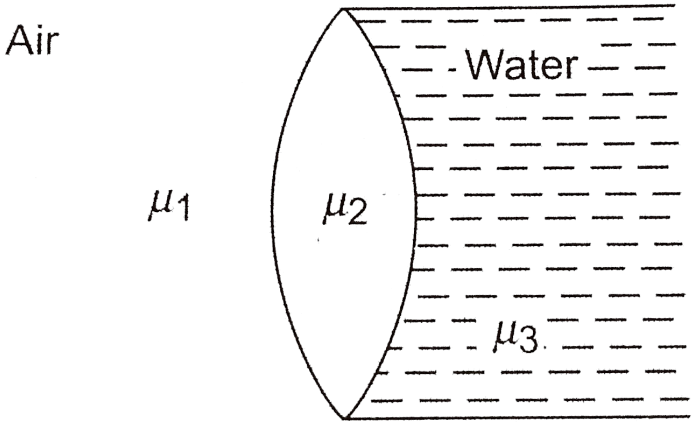
Watch Video Solution



23.

Find the focal length of the lens as shown in figure.

Watch Video Solution



24.

if $\mu_2 = {}_a u_g = \frac{3}{2}, \mu_3 = {}_a u_\omega = \frac{4}{3},$ magnitude of radii of carvature of lens are 10 cm and 20 cm find focal length of lens if rays are incident from (a) air and (b) water,

Watch Video Solution

25. An equi-convex lens of $(\mu = 3/2)$ and focal length 10 cm is held with its axis vertical and its lower surface immersed in water $(\mu = 4/3)$, the upper surface being in air. At what distance from the lens, will a vertical beam of parallel light incident of the lens be focused?

Watch Video Solution

26. A long cylindrical tube containing water in closed by an equinvex lens of local length 10 cm in air. A point source is placed along the axis of the tube outside it at a distance of 21 cm from the lens. Locate the final image of the source. Refractive index of the materials of the lens =1.5 and that of water =1.33.

Watch Video Solution

27. A point object is located at a distance of 15 cm, from the front surface of a thick bi-convex lens. The lens is 10 cm thick and radii of its front and back surfaces are 10 cm and 25 cm respectively. How fae beyond the back surface of this lens $(\mu = 1.5)$ is the image formed?

Watch Video Solution

28. A biconvex thick lens is constructed with glass (mu = 1.50). Each of the surfaces has a

radius of 10 cm and the thickness at the middle is 5 cm. Locate the image of an object placed far away from the lens.

Watch Video Solution

29. A plano-convex lens has thickness 4cm. When places on a horizontal table with the curved surface in contact with it, the apparent depth of the bottom-most point of the lens if found to be 3cm. If the lens is inverted such that the plane face is in contact with the table,

the apparent depth of the center of the plane face of the lens is face of the lens is found to be $25/8$ cm. Find the focal length of the lens.

Watch Video Solution

30. (a) A magnifying lens has a focal length of 10 cm, (a) Where should the object be placed if the image is to be 30 cm from the lens ? (b) What will be the magnification ?

(b). A pin length 2.00 cm is placed perpendicular to the principal axis of a

converging lens. An inverted image of size 1.00 cm is formed at a distance of 40.0 cm fromthe pin. Find focal length of the lens and its distance from the pin.

Watch Video Solution

31. A convex lens produces a double size real image when an object is placed at a distance of 18 cm from it. Where should the object be placed to produce a triple size real image ?

Watch Video Solution

32. A 5.0 diopter lens forms a virtual image which is 4 times the object placed perpendicularly on the principal axis of the lens. Find the distance of the object from the lens.

Watch Video Solution

33. An object 2.5 cm high is placed in front of a convex lens of focal length 30 cm. If the height

of image formed is 5 cm, find the distance between the object and the image?

Watch Video Solution

34. A pin of length 2.0 cm lies along the principal axis of a converging lens, the centre being at a distance of 11 cm from the lens. The focal length of the lens is 6 cm. Find the size of the image.

Watch Video Solution

35. The distance between two point sources of light is $24cm$. Find out where would you place a converging lens of focal length $9cm$, so that the images of both the sources are formed at the same point.

Watch Video Solution

36. A point object is placed on the principal axis of a convex lens (f = 15 cm) at a distance of 30 cm from it. A glass plate $(\mu = 1.50)$ of thickness 1 cm is placed on the other side of

the lens perpendicular to the axis. Locate the image of the point object.

Watch Video Solution

37. A convex lens is held $45cm$ above the bottom of an empty tank. The image of a point at the bottom of a tank is formed $36cm$ above the lens. Now, a liquid is poured into the tank to a depth of $40cm$. It is found that the distance of the image of the same point on

the bottom of the tank is $48cm$ above the lens. Find the refractive index of the liquid.

Watch Video Solution

38. A small fish 0.4 m below the surface of a lake is viewed through a simple converging lens of focal length 3 m.the lens is kep at 0.2 m above the water surface such that the fish lies on the optical axis of the lens. Find the image of the fish seen by the observed. $\left(\mu_{water} = \frac{4}{3}\right)$

Watch Video Solution

39. A converging beam of light forms a sharp image on a screen. A lens is placed in the path of the beam at $10cm$ from the screen. It is found that the screen has to be moved $8cm$ further away from the lens to obtain a sharp image. Find the focal length and nature of the lens.

Watch Video Solution

40. A point object O is placed at a distance of 0.3 m from a convex lens of focal length 0.2 m. It is then cut into two halves each of which is displaced by 0.0005 m as shown in figure.

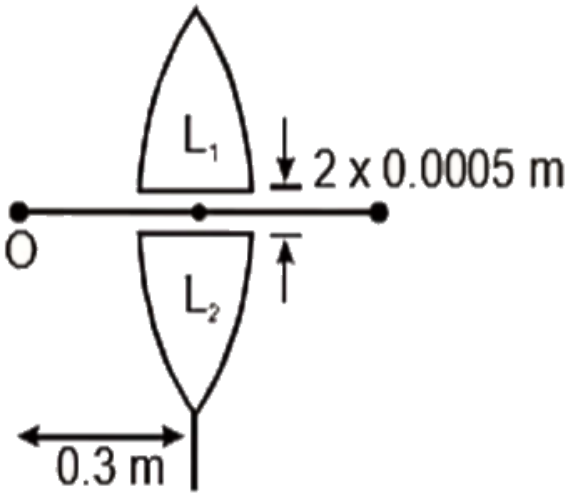


image will be formed from the lens at a distance of

Watch Video Solution

41. An image Y is formed of a point object x by a lens whose optic axis is AB as shown in Figure. Draw a ray diagram to locate the lens and its focus. If the image Y of object X is formed by a concave mirror (having the same optic axis AB) instead of lens, draw another ray diagram to locate the mirror and its focus. Write down the steps of construction of the

ray diagrams.

Watch Video Solution

42. A point object moves along the principal axis of a convex lens of focal length f, such that its image also formed on the principal axis at a distance $\frac{4f}{3}$ (at $t = 0$) moves away from the lens with a uniform velocity α. Find

the velocity of point source as a function of time t.

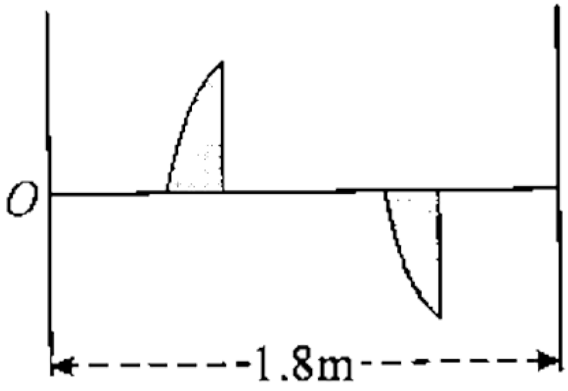
Watch Video Solution

43. An object is placed at a distance of 75 cm from a screen. Where should a convex lens of focal length 12 cm be placed so as to obtain a real image of the object?

Watch Video Solution

44. A thin plano-convex lens of focal length f is split into two halves. One of the halves is shifted along the optical axis as shown in figure. The separation between object and image planes is 1.8 m. The magnification of the image, formed by one of the ball lens is 2. Find the focal length of the lens and separation between the two halves. Draw the ray diagram

for image formation.



Watch Video Solution

45. Two plano-concave lenses of glass of refractive index 1.5 have radii of curvature of 20 and 30 cm. They are placed in contact with curved surface towards each other and the

space between them is filled with a liquid of refractive index $\frac{4}{3}$, find the focal length of the system.

Watch Video Solution

46. A point object is placed at a distance of 15 cm from a convex lens. The image is formed on the other side at a distance of 30 cm from the lens. When a concave lens is placed in contact with the convex lens, the image shifts away

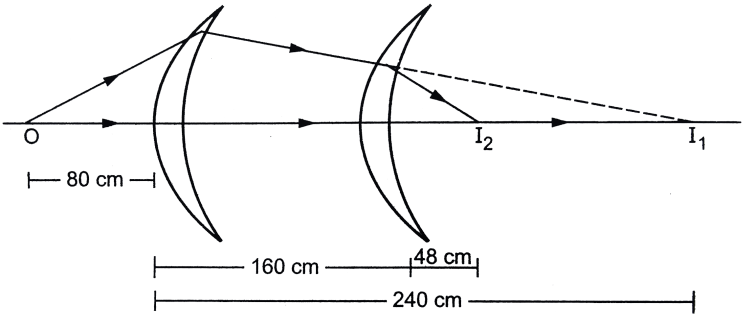
further by 30 cm. Calculate the focal lengths of the two lenses.

Watch Video Solution

47. A 5 mm high pin is placed at a distance of 15 cm from a convex lens of focal length 10 cm. A second lens of focal length 5 cm is placed 40 cm from the first lens and 55 cm from the pin. Find (a) the position of the final image, (b) its nature and (c) its size.

Watch Video Solution

48. A concave convex figure lens made of glas $(\mu = 1.5)$ has surface of radii 20 cm and 60 cm. a. Locate the image ofan object placed 80 cm to the left of the lens along the principal axis. B. A similar lens is placed coaxially at distanc of 160 cm right of it. Locate the position of the image.



Watch Video Solution

49. A convex lens A of focal length $20cm$ and a concave lens B of focal length $5cm$ are kept along the same axis with a distance d between them. If a parallel beam of light falling on A and B as a parallel beam, then d is equal to ..... cm

Watch Video Solution

50. A convex lens of focal length 20 cm and a concave lens of focal length 10 cm are placed 10 cm apart with their principal axes coinciding. A beam of light travelling parallel to the principal axis and having a beam diameter 5.0 mm, is incident on the combination. Show that the emergent beam is parallel to the incident one. Find the beam diameter of the emergent beam.

Watch Video Solution

51. A diverging lens of focal length 20 cm and a converging lens of focal length 30 cm are placed 15 cm apart with their principal axes coinciding. Where should an object be placed on the principal axis so that its image formed at infinity ?

Watch Video Solution

52. Two convex lenses each of focal length 10 cm, are placed at a saparation of 15 cm with their principal axes coinciding. (a) Show that a

light beam coming parallel to the principal axis diverges as it comes out of the lens system. (b) Find the location of the virtual image formed by the lens system of an object placed far away. (c) Find the focal lenth of the equivalent lens.

Watch Video Solution

53. A converging lens of focal length 15 cm and a converging mirror of focal length 10 cm are placed 50 cm apart. If a pin of length 2.0 cm is

placed 30 cm from the lens farther away from the mirror, where will the final image form and what will be the size of the final image ?

Watch Video Solution

54. A converging lens of focal length 15 cm and a converging mirror of focal length 10 cm are placed 50 cm apart with common principal axis. A point source is placed in between the lens and the mirror at a distance of 40 cm

from the lens. Find the locations of the two images formed.

Watch Video Solution

55. A concave lens of focal length 20 cm is placed 15 cm in front of a concave mirror of radius of curvature 26 cm and further 10 cm away from the lens is placed an object. The principal axis of the lens and the mirror are coincident and the object is on the axis Find the position and nature of the image.

Watch Video Solution

56. A conveying lens of focal length 15 cm and a converging mirror of focal length 20 cm are placed with their principal axes coinciding. A point source S is placed on the principal axis at a distance of 12 cm from the lens as shown in figure. It is found that the final beam comes out parallel to the principal axis. Find the separation between the mirror and the lens.

View Text Solution

57. (a) A point source S is placed at a distance of 15 cm from a converging lens of focal length 10 cm on its principal axis, where should a diverging mirror of focal length 12 cm be placed so that a real image is formed on the source itself?

(b) A diverging lens of focal length 20 cm and a converging mirror of focal length 10 cm are placed coaxially at separation of 5 cm. Where should an object be placed so that a real image is formed at the object itself?

(c) A converging lens of focal length 12 cm and a

diverging mirror of focal length 7.5 cm are placed 5.0 cm apart with the principal axis coinciding where should an object be placed so that its image falls on itself?

Watch Video Solution

58. A converging lens and a diverging mirror are placed at a separation of 15 cm. The focal length of the lens is 25 cm and that of the mirror is 40 cm. Where should a point source be placed between the lens and the mirror so that the

light, after getting reflected by the mirror and then getting transmitted by the lens, comes out parallel to the principal axis ?

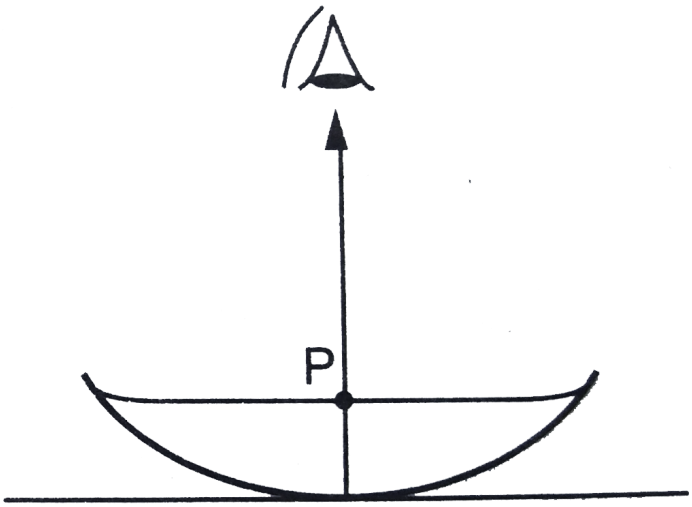
Watch Video Solution

59. A concave mirror of radius R is kept on a horizontal table. Water (refractive index =mu.) is poured into it up to a height h. Where should an object be placed so that its image is formed on itself ?

Watch Video Solution

60. A concave mirror of radius 40 cm lies on a horizontla tale and wateis filled in it up t a heightof 5.00 cm. A small dust particle floats on the water surface at a point P vertically above tge pointof contact of the miror with the table. Locate the image of the dust particle as seen from a point directly above it. tEh refractie index

of water is 1.33.



Watch Video Solution

61. The radius of curvature of the convex face of a plano-convex lens is 12 cm and its refractive index is 1.5 (a)Find the focal length of this

lens.The plane surface of the lens is now silvered. (b)At what distance from the lens will parallel rays incident on the convex face converge? (c)Sketch the ray diagram to locate the image,when a point object is placed on the axis $20cm$from the lens (d)Calculate the image distance when the object is placed as in (c).

Watch Video Solution

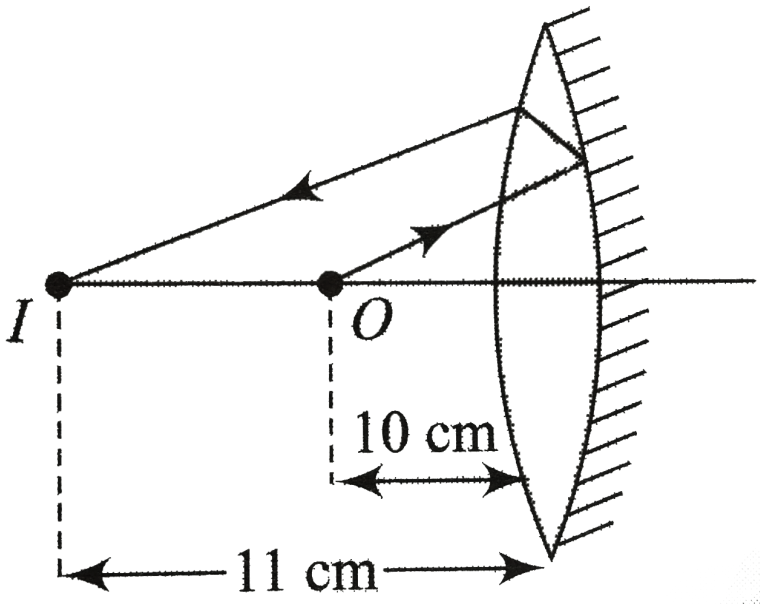
62. The convex lens of a thin plano-convex lens $(\mu = 1.5)$ with $R = 60cm$ is silvered to obtain a

concave mirror. An object is located at a distance 25 cm in front of this mirror, find the distance of the image from mirror.

Watch Video Solution

63. A pin is placed 10cm in front of a convex lens of focal length 20cm, made of a material having refractive index 1.5 . The surface of lens farther away from the pin is silvered and has a radius of curvature 22cm. Determine the position of the

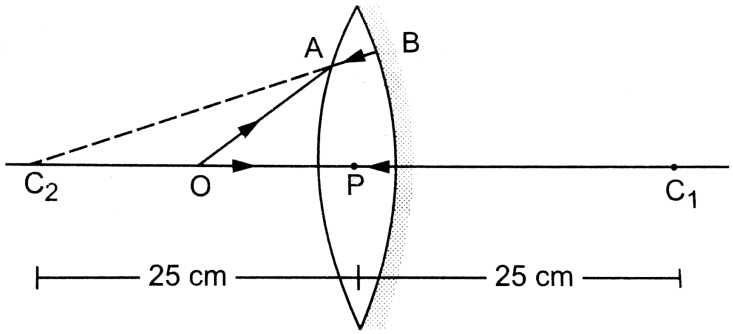
final image. Is the image real or virtual?



Watch Video Solution

64. A biconvex thin lens is prepared from glass $(\mu = 1.5)$, the two bounding surfaces having equal radii of 25 cm each. One of the surfaces is

silvered from outside to make it reflecting. Whee should an object be placed before this lens so that the image is formed on the object itself?



Watch Video Solution

65. The convex surface of a thin concave-convex lens of glass of refractive index 1.5 has a radius of curvature 20 cm. The concave surface has a

radius of curvature 60 cm. The convex side is silvered and placed on a horizontal surface as shown in figure. (a) Where should a pin be placed on the axis so that its image is formed at the same place ? (b) If the concave part is filled with water (mu = 4/3), find the distance through which the pin should be moved so that the image of the pin again coincides with the pin.

Watch Video Solution

66. A thin gollow equiconvex lens, silvered at the back, converges a parallel beam of light at a distance of 0.2 m in front of it. Where will it converge the same light if filled with water having $\mu = (4/3)$?

Watch Video Solution

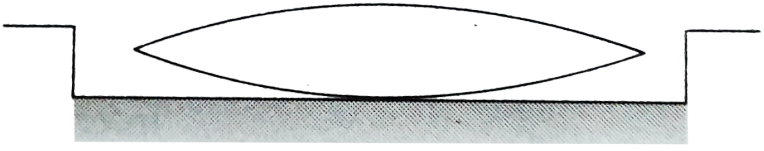
67. One side of radius of curvature $R_2 = 120cm$ of a convexo-convex lens of material of refractive index $\mu = 1.5$ and focal length $f_1 = 40cm$ is

slivered. It is placed on a horizontal surface with silvered surface in contact with it. Another convex lens of focal length $f_2 = 20cm$ is fixed coaxially $d = 10cm$ above the first lens. A luminous point object O on the axis gives rise to an image coincide with it. Find its height above the upper lens.

Watch Video Solution

68. A thin equiconvex lens of refractive index $3/2$ is placed on a horizontal plane mirror as shown

in figure. The space between the lens and the mirror is filled with a liquid of refractive index $4/3$. It is found that when a point object is placed 15 cm above the lens on its priincipal axis, the object coincides with its own image.

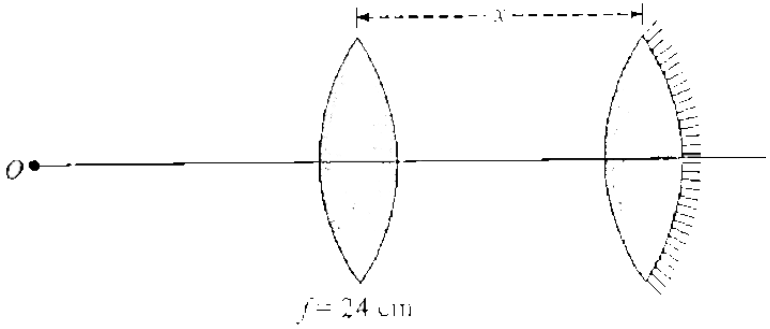


Q. If another liquid is filled instead of water, the object and the image coincide at a distance 25 cm from the lens.

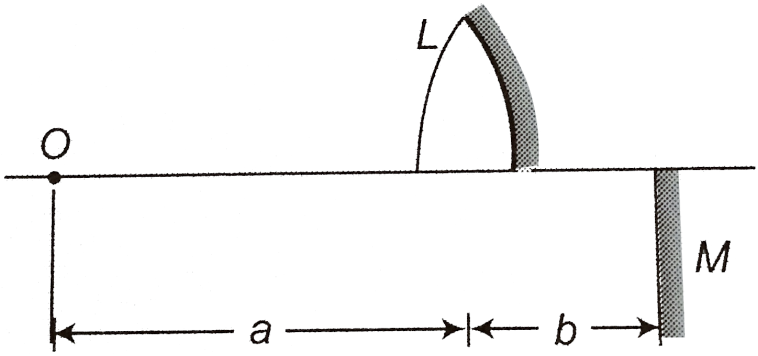
Calculate the refractive index of the liquid.

Watch Video Solution

69. The radius of curvature of the curved surfaces of an equiconvex lens is 32 cm and its refractive index is $\mu = 1.5$. One of its side is silvered and placed 14 c away from an object as shown in figure. At what distance x should a second convex lens of focal length 24 cm be placed so that the image coincides with the object.



Watch Video Solution



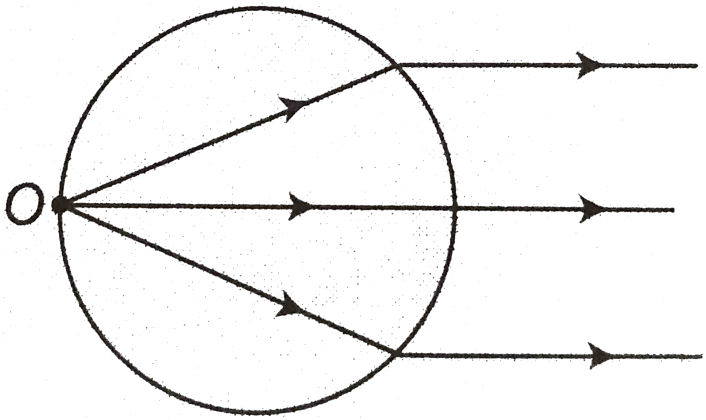
70.

As shown in figure. L is half part of an equiconvex lens $(\mu = 1.5)$ whose surface have radius of curvature $R = 40cm$ and its right surface in silvered. Normal to principal axis, a plane mirror M is placed on the right of lens. A small object O is placed on left of the lens such that there is no parallax between final images formed by the lens

and mirror. If transverse length of final image formed by the lens is twice that of image formed by the mirror. Calculate distance a between lens and object and distance b.

View Text Solution

Exercises



1.

An object O is stuck on the surface of a transparent solid spher of radius 20 cm. Find refractive index of the sphere such that rays from the object after refraction from the opposite side emerge as a parallel beam, as shown Also prove that refractive index has the same value in the given situation for any value of radius of sphere.

A. 1.5

B. 1.67

C. 2

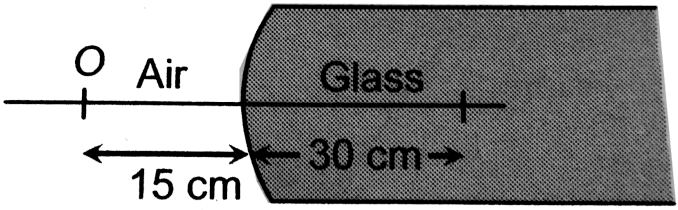
D. 2.5

Answer: C

Watch Video Solution

2. A poinit object O is placed in front of a glass rod having spherical end of radius of curvature

$30cm$. The image would be formed at



A. 30 cm left

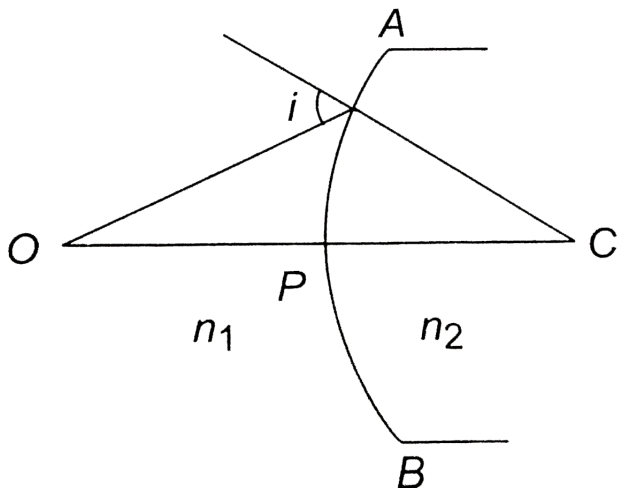
B. infinity

C. 10 cm to the light

D. 18 cm to the left

Answer: A

Watch Video Solution



3.

A point object O is kept at a distance $OP = u$ The radius of curvature of the spherical surface APB is $CP = R$ The refractive index of the media are n_1 and n_2 which are as shown in the diagram . Then,

(A) if $n_1 > n_2$, image is virtual for all values of u

(B) if $n_2 = 2n_1$ image is virtual when $R > u$

(C) The image is real for all values of u, n_1 and n_2

here, the correct statements is/are

A. only (B)

B. both (A) and (B)

C. only (A)

D. (A),(B) and (C)

Answer: B

Watch Video Solution

4. 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

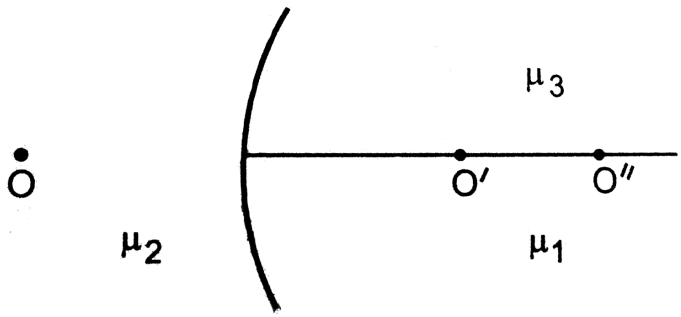
D. 1.5 R

Answer: A

Watch Video Solution

5. Figure shows figure three transparent medi of refractive indices μ_1, μ_2 and μ_3. A point object O is placed in the medium μ_2. If the entire medium on the right of the spherical surface has refractive index μ_1, the image forms at O. If this entire medium has refractive index μ_2 the image

form at O''. In the situation shown



A. the image forms between and O' and O''

B. the image forms to the left of O'

C. the image forms to the right of O''

D. 2 images, one at O' and the other at O''

Answer: D

Watch Video Solution

6. A glass hemisphere of radius 0.04 m and refractive index of the material 1.6 is placed centrally over cross mark on a paper (i) with the flat face, (ii) with the curved face in contact with the paper. In each case, the cross mark is viewed directly from above. The position of the images will be

A. (i) 0.04 m from the flat face, (ii) 0.025 m from the flat face

B. (i) at the same position of the cross mark, (ii) 0.025 m below the flat face

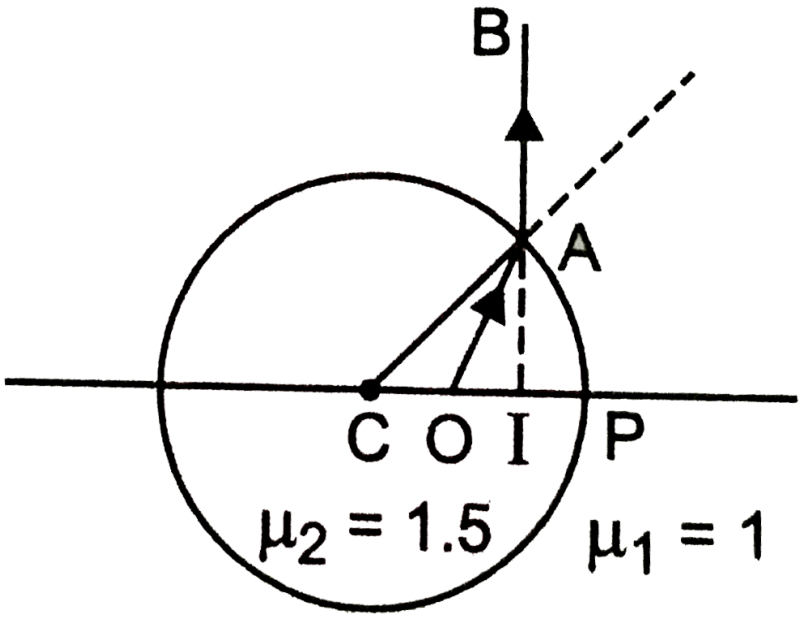
C. (i) 0.025 m from the flat face, (ii) 0.04 m from the flat face

D. for both (i) and (ii) 0.025 m from the highest point of the hemisphere

Answer: B

Watch Video Solution

7. A small air bubble in a glass sphere of radius $2cm$ appears to be $1cm$ from the surface when looked at, along a diameter. If the refractive index of glass is 1.5, find the true position of the air bubble.



A. 1.2 cm

B. 3.2 cm

C. 2.8 cm

D. 1.6 cm

Answer: A

Watch Video Solution

8. A ray of light falls on the surface of a spherical glass paper weight making an angle α with the normal and is refracted in the medium at an

angle β. The angle of deviation of the emergent ray from the direction of the incident ray is :

A. $(\alpha - \beta)$

B. $2(\alpha - \beta)$

C. $\frac{\alpha - \beta}{2}$

D. $(\beta - \alpha)$

Answer: B

Watch Video Solution

9. Focal length of a convex lense in air is $10cm$. Find its focal

length in water. Given that $\mu_g = 3/2$ and $\mu_w = 4/3$.

A. 2.5 cm

B. 5 cm

C. 20 cm

D. 40 cm

Answer: D

Watch Video Solution

Watch Video Solution

10. The radius of curvature of the convex surface of a thin plano-convex lens is 15 cm and the refractive index of its material is 1.6. The power of the lens is

A. $+1D$

B. $-2D$

C. $+3D$

D. $+4D$

Answer: D

Watch Video Solution

11. A convex lens of glass has power P in air. If it is immersed in water its power will be

A. $> P$

B. $< P$

C. P

D. none

Answer: B

Watch Video Solution

12. 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. convergent lens of focal length 3.5 R

B. convergent lens of focal length 3.0 R

C. divergent lens of focal length 3.5 R

D. divergent lens of focal length 3.0 R

Answer: A

Watch Video Solution

13. In figure, an air lens of radius of curvature of each surface equal to $10cm$ is cut into a cylinder of glass of refractive index 1.5. The focal length and the nature of lens are

A. 15 cm, concave

B. 15 cm, convex

C. ∞, neither concave nor convex

D. 0, concave

Answer: A

Watch Video Solution

14. A thin convergent glass lens $(\mu_g = 1.5)$ has a power of $+5.0D$. When this lens is immersed in a liquid of refractive index μ_1, it acts as a

divergent lens of focal length $100cm$. The value of μ_1 is

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

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

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

D. 2

Answer: C

Watch Video Solution

15. A hollow double concave lens is made of very thin transparent material. It can be filled with air or either of two liquids L_1 or L_2 having refractive indices mu_1 and mu_2 respectively $(\mu_2 > \mu_1 > 1)$. The lens will deverge a parallel beam of light if it is filled with

A. air and placed in air

B. air and immersed in L_1

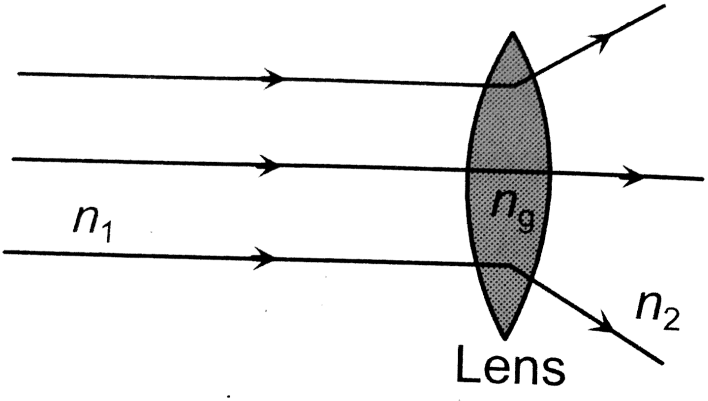
C. L_1 and immersed in L_2

D. L_2 and immersed in L_1

Answer: D

Watch Video Solution

16. The ray diagram could be correct



A. if $n_1 - n_2 = n_g$

B. if $n_1 = n_2$ and $n_1 < n_2$

C. if $n_1 = n_2$ and $n_1 > n_g$

D. under no circumstances

Answer: A

Watch Video Solution

17. A lens of refractive index n is put in a liquid of refractive index n'. If focal length of lens in air is f, its focal length in liquid will be.

A. $\frac{fn'(n-1)}{n'-n}$

B. $\frac{f(n' - 1)}{n'(n - 1)}$

C. $\frac{n'(n - 1)}{f(n' - 1)}$

D. $\frac{fn'n}{n - n'}$

Answer: A

Watch Video Solution

18. 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. become infinite

B. become small, but non-zero

C. remain unchanges

D. become zero

Answer: A

Watch Video Solution

19. Four lenses are made from the same type of glass, the radius of curvature of each face is

given below. Which will have the greatest positive power

A. 10 cm convex and 15 cm concave

B. 5 cm convex and 10 cm concave

C. 15 cm convex and plane

D. 20 cm convex and 30 cm concave

Answer: B

Watch Video Solution

20. An equi-convex glass lens with radius of each face as R is placed in air $\left(._a u_g = 3/2\right)$. "If there is water in the object space and air in the image space and given" $._a u_w = 4/3$, the focal length of the lens is

A. 4 R

B. 2 R

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

D. R

Answer: C

Watch Video Solution

21. In the above question if there is air in the object space and water in the image space, then the focal length is

A. 4 R

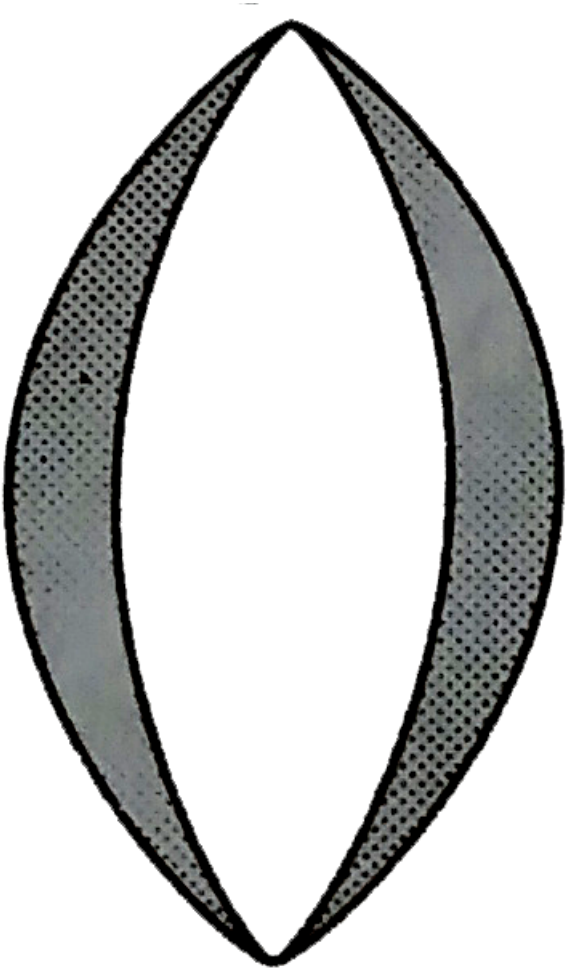
B. 2 R

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

D. R

Answer: B

Watch Video Solution



22.

A convex lens is made of 3 layers of glass of 3

different materials as in the figure. A point object is placed on its axis. The number of images of the object are

A. 3

B. 4

C. 1

D. 2

Answer: C

Watch Video Solution

23. The focal length for violet, green and red light rays are f_V, f_G and f_R respectively. Which fo the following is the true relationship?

A. $f_R < f_G < f_V$

B. $f_V < f_G < f_R$

C. $f_G < f_R < f_V$

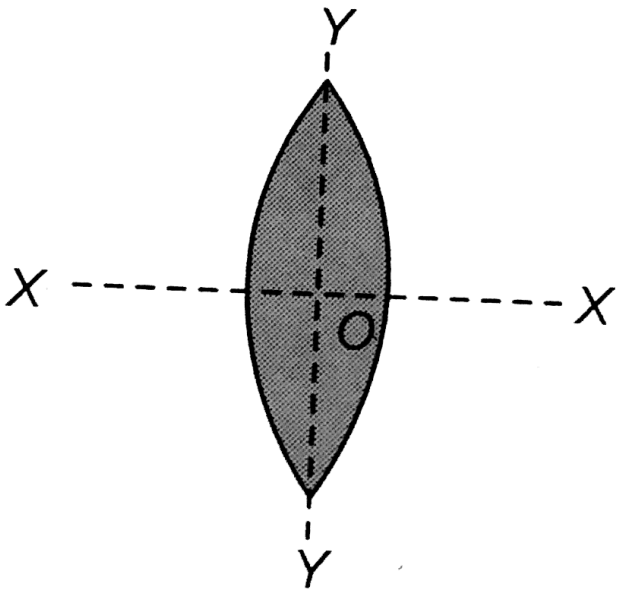
D. $f_G < f_V < f_R$

Answer: B

Watch Video Solution

24. 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. $f' = 2f, f'' = f$

B. $f' = f, f'' = f$

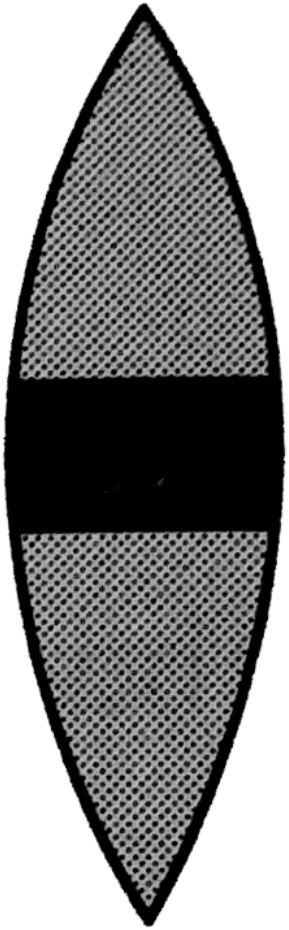
C. $f' = 2f, f'' = 2f$

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

Answer: A

Watch Video Solution

25. If the central portion of a convex lens is wrapped in black paper as shown in figure



A. no image will be formed by the remaining portion of the lens

B. full image will be formed, but it will be less bright

C. the central portion of the image will be missing

D. there will be two images, each produced by one of the exposed portions of lens

Answer: A

Watch Video Solution

26. A convex forms a real image of a poinnt object placed on its principal axis. If the upper half of the lens is painted black

A. the image will be shifted downward

B. the image will be shifted upward

C. the image will not be shifted

D. the intensity of the image will decrease

Answer: A

Watch Video Solution

27. A thin lens focal length f_1 and its aperture has diameter d. It forms an image of intensity I. Now the central part of the aperture up to diameter $\frac{d}{2}$ is blocked by an opaque paper. The focal length and image intensity will change to

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

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

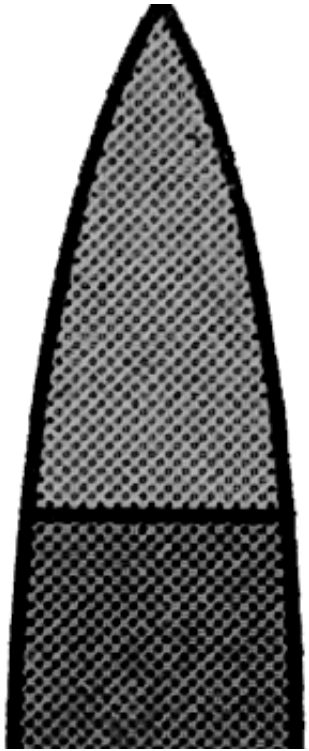
C. $\frac{3f}{4}, \frac{I}{2}$

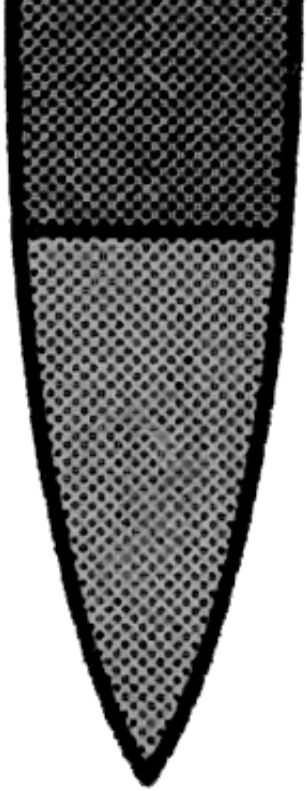
D. $f, \frac{3I}{4}$

Answer: D

Watch Video Solution

28. A convex lens is made up of three different materials as shown in the figure. For a point object placed on its axis, the number of images formed are





A. 1

B. 5

C. 4

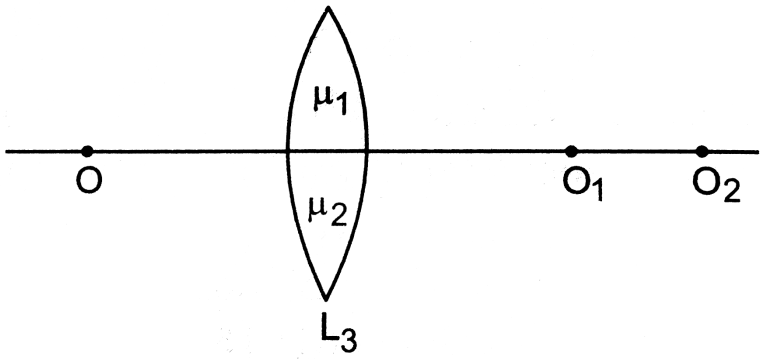
D. 3

Answer: A

Watch Video Solution

29. consider three congerging lenses L_1, L_2 and L_3 having identical geometrical construction. The index of refraction of L_1 and $L_2 are \mu_1$ and μ_2 respectively. The upper half of the lens L_3 has a refractive index μ_1 and the lower half has μ_2. A point object O is imaged at O_1 by the lens L_1 and $at O_2$ by the lens L_2 placed in same position . If L_2 is placed at the

same place.



A. (i),(ii)

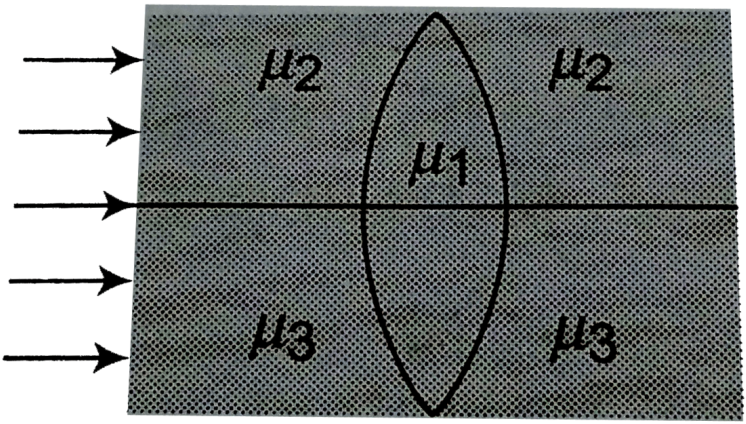
B. (ii),(iii)

C. (i),(iii)

D. (iii),(iv)

Answer: A

Watch Video Solution



30.

A double convex lens made of a material of refractive index μ_1, is placed inside two liquids of refractive indices μ_2 and μ_3 as shown $(\mu_1 > \mu_2 > \mu_3)$ A wide parallel beam of light is incident on the lens from the left. The lens will give rise to

A. a single convergent beam

B. two different convergent beams

C. two different divergent beams

D. a convergent and a divergent beam

Answer: A

Watch Video Solution

31. A parallel beam of light is incident on a converging lens parallel to its principal axis. As

one moves away from the les on the other side on its principal axis, the intensity of light

A. remains constant

B. continuously increases

C. continuously decreases

D. first increases then decreases

Answer: A

Watch Video Solution

32. A point source of light is placed at a distance of 2f from a converging lens of focal length f. The intensity onteh other side of the lens is maximum at a distance

A. f

B. f between f and $2f$

C. $2f$

D. more than $2f$

Answer: A

Watch Video Solution

Watch video solution

33. A thin lens, made of glass of refractive index $3/2,$ produces a real and magnified image of an object in air. If the whole system, maintaing the same distance between the object and the lens, is immersed in water $(RI = 4/3),$ then the image formed will be

A. real and magnified

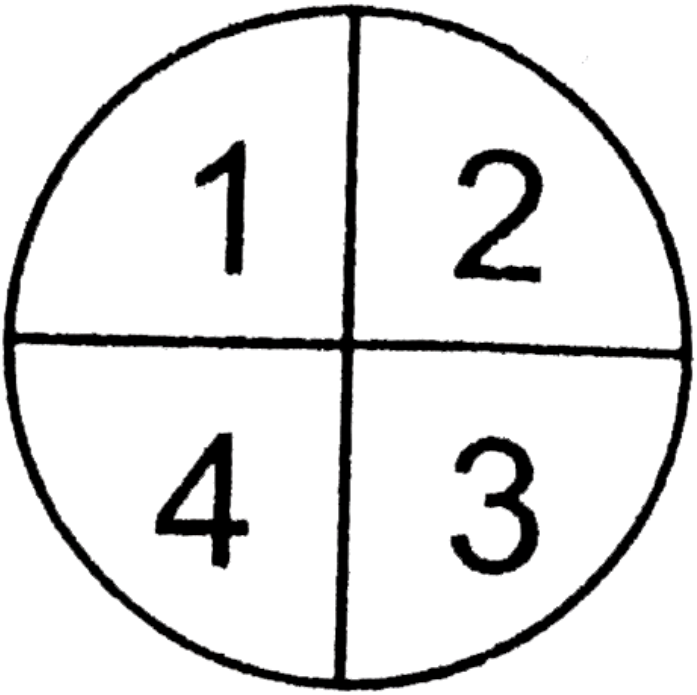
B. virtual and magnified

C. virtual and magnified

D. virtual and diminished

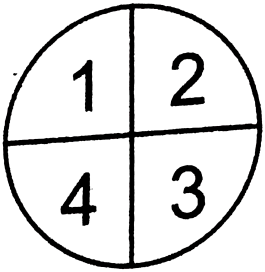
Answer: C

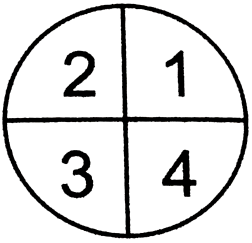
Watch Video Solution

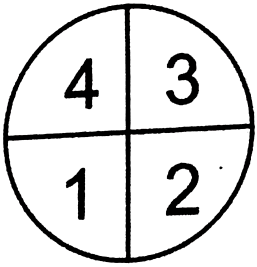


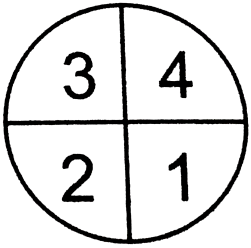
34.

A convex lens is used to form a real image of the object shown in the figure. The real inverted image shown in the following figures is

A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

35. A convex lens of focal length 16 cm forms a real image double the size of the object. The image distance of the object from the lens is

A. 32 cm

B. 24 cm

C. 20 cm

D. 8 cm

Answer: B

Watch Video Solution

36. An object 1.5 cm high is placed 10 cm from the optical centre of a thin lens. Its image is formed 25 cm from the optical centre on the same side of the lens as the object. The height of the image is

A. 2.5 cm

B. 0.2 cm

C. 1.67 cm

D. 3.75 cm

Answer: D

Watch Video Solution

37. A needle of height 5 cm placed 45 cm from a lens forms an image on a screen placed 90 cm on the other side of the lens the type of lens and its focal length are

A. convex 30 cm

B. concave, 30 cm

C. virtual 20 cm

D. concave 60 cm

Answer: A

Watch Video Solution

38. In previous question, the nature and size of the image are

A. real 20 cm

B. real 10 cm

C. virtual 20 cm

D. virtual 10 cm

Answer: B

Watch Video Solution

39. 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. 10 cm

C. 15cm

D. 20 cm

Answer: B

Watch Video Solution

40. The focal length of convex tens is f and the distance of an object from the principal focus is

x. The ratio of the size of the real image to the size of the object is

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

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

C. $\frac{f+x}{f}$

D. $\frac{f}{f+x}$

Answer: A

Watch Video Solution

41. The distance between an object and its real image formed by a lens is D. If the magnification is m, the focal length of the lens is

A. $\frac{(m-1)D}{m}$

B. $\frac{mD}{(m+1)}$

C. $\frac{(m-1)D}{m^2}$

D. $\frac{mD}{(m+1)^2}$

Answer: D

Watch Video Solution

42. An object is placed at a distance of 12 cm from a convex lens on its principal axis and a virtual image of certain size is formed. If the object is moved 8 cm away from the lens, a real image of the same size as that of the virtual image is formed. The focal length of the lens in cm is

A. 15

B. 16

C. 18

D. 19

Answer: B

Watch Video Solution

43. When an object is moved along the axis is of a lens images three times the size, of the object are obtained when the object is at 16 cm and at 8 cm respectively from the lens. The focal length and nature of the lens are

A. 12 cm concave

B. 4 cm concave

C. 12 cm convex

D. 4 cm convex

Answer: C

Watch Video Solution

44. The distance between two point object P and Q is 32 cm, a convex lens of focal length 15 cm is palced bewteen them so that the images of both the objects are formed at the same place. The

distance of P from the lens could be

(i) 20 cm

(ii) 18 cm

(iii) 16 cm

(iv) 12 cm

A. (i),(ii)

B. (ii),(iii)

C. (iii),(iv)

D. (i),(iv)

Answer: D

Watch Video Solution

45. An image of a bright square is obtained on a screen with the aid of a convergent lens. The distance between the square and the lens is 40cm. The area of the image is nine times larger than that of the square. Select the correct statement(s):

A. 30 cm

B. 50 cm

C. 60 cm

D. 75 cm

Answer: A

Watch Video Solution

46. 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. $\left[\frac{1}{A_1}+\frac{1}{A_2}\right]^{-1}$

C. $\sqrt{A_1A_2}$

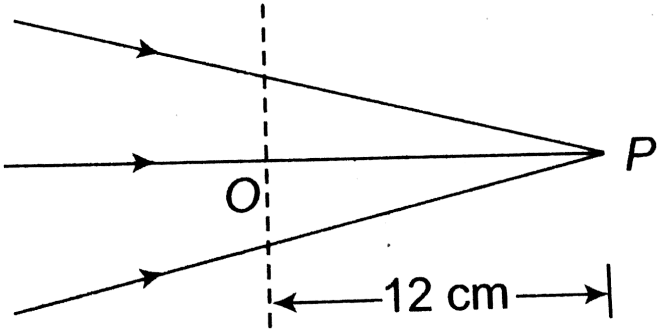
D. $\left[\frac{\sqrt{A_1}+\sqrt{\_2}}{2}\right]^2$

Answer: C

Watch Video Solution

47. Figure given below shows a beam of light converging at point P. When a concave lens of focal length $16cm$ is introduced in the path of

the beam at a place O shown by dotted line such that OP becomes the axis of the lens, the beam converges at a distance x from the lens. The value x will be equal to



A. 12 cm

B. 24 cm

C. 36 cm

D. 48 cm

Answer: D

Watch Video Solution

48. A converging beam of rays in incident on a diverging lens. Having passed through the lens the rays intersect at a point $15cm$ from the lens. If the lens is removed, the point where the rays meet, move $5cm$ closer to the mounting that holds the lens. Find the focal length of the lens.

A. $-30cm$

B. $5cm$

C. $-10cm$

D. 20cm

Answer: A

Watch Video Solution

49. A cardsheet divided into squares each of size $1mm^2$ is being viewed at a distance of $9cm$ through a magnifying glass (a conerging lens of focal length $10cm$) held close to the eye.

(a) What is the magnification produced by the lenas ? How much is the area of each square to the virtual image ?

(b) What is the angular magnification (magnifying power) of the lens ?

(c) Is the magnification in (a) equal to the magnifying power in (b) ? Explain

A. $1cm^2$

B. $0.81cm^2$

C. 0.27^2

D. $0.60cm^2$

Answer: A

Watch Video Solution

50. Rays of light from Sun falls on a biconvex lens of focal length f and the circular image of Sun of radius r is formed on the focal plane of the lens. Then

A. $\pi r_2 \propto f$

B. $\pi r^2 \propto f^2$

C. if lower half part is covered by black sheet, then area of the image is equal to $\frac{\pi r^2}{2}$

D. if f is doubled intensity will increase

Answer: B

Watch Video Solution

51. 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. $6.5 \times 10^{-5} m$

B. $12.4 \times 10^{-4} m$

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

D. $6.5 \times 10^{-4} m$

Answer: C

Watch Video Solution

52. The distance between an object and its real image formed by a convex lens cannot be

A. greater than 2 f

B. less than 2 f

C. greater than 4 f

D. less than 4 f

Answer: A

Watch Video Solution

53. A thin converging lens of focal length f is placed bewteen an obejct an a screen at a distance D apart, (displacement method)

A. if $D > 4f$, there are two positions of the lens as which a sharp image of the object is formed on the screen

B. $f = \frac{D^2 - x^2}{4D}$, x, distance between two position of the lens

C. $m_1 = \frac{D + x}{D - x}$,$m_2 = \frac{D - x}{D + x}$, for two positions of the lens Object size

$$O = \sqrt{I_1 I_2}, f = \frac{x}{m_1 - m_2}$$

D. all options are correct.

Answer: A

Watch Video Solution

54. In the displacement method, a convex lens is placed in between an object and a screen if the magnification in the two position are m_1 and $m_2 (m_1 > m_2)$ and the distance between the

two positions of the lens is x, the focal length of the lens is

A. $\frac{x}{m_1 + m_2}$

B. $\frac{x}{m_1 - m_2}$

C. $\frac{x}{(m_1 + m + 2)^2}$

D. $\frac{x}{(m_1 - m_2)^2}$

Answer: A

View Text Solution

55. The distance between the object and the screen is d (greater than 4 times the focal length of a convex lens). Real images of the object are obtained on the screen for two positions of the lens that are separated by distance x apart. The ratio of size of the images in the two positions of the lens are

A. $\sqrt{\frac{D}{x}}$

B. $\frac{D^2}{x^2}$

C. $\sqrt{\frac{x}{D}}$

D. $\frac{(D-x)^2}{(D+x)^2}$

Answer: A

Watch Video Solution

56. 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. 6.25 cm

B. 1.5 cm

C. 6 cm

D. 36 cm

Answer: C

Watch Video Solution

57. The distance between an object and the screen is 100cm. A lens produces an image on the screen when the lens is placed at either of

the positions 40cm apart. The power of the lens is nearly

A. 3 D

B. 5 D

C. 7 D

D. 9 D

Answer: B

Watch Video Solution

58. A screen is placed a distance 40 cm away from an illuminated object. A converging lens is palced between the source and the screen and it is attempted to form the image of the source on the screen. If no position could be found, the focal length of the lens

A. must be less than 10 cm

B. must be greater than 20 cm

C. must not be greater than 20 cm

D. must not be less then 10 cm

Answer: B

Watch Video Solution

59. In an experiment with a lens the object distance u versus image distance v data were obtained. Which of the following graphs will be linear? (Choose incorrect option)

A. $\frac{1}{v}$ v/s $\frac{1}{u}$

B. uv v/s $(u+v)$

C. $\frac{v}{u}$ v/s v

D. v v/s u

Answer: A

Watch Video Solution

60. The graph between the object distance along the X-axis and image distance along Y-axis for a convex lens is

A. a straight line

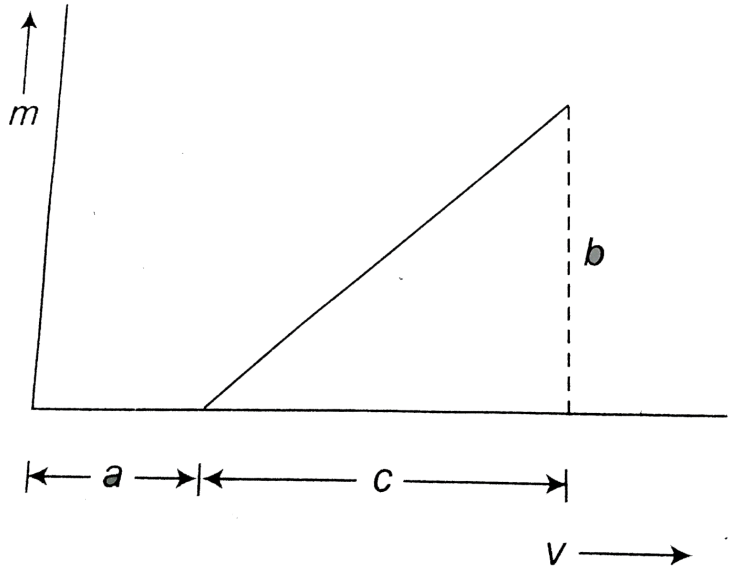
B. a parabola

C. a circle

D. a rectangular hyperbola

Answer: A

Watch Video Solution



61.

The graps shows the variation of magnification m produced by as convex lens with the image distance v. The focal length of the lens is

A. $\frac{b}{c}$

B. $\frac{c}{b}$

C. a

D. $a, \frac{b}{c}$

Answer: D

Watch Video Solution

62. In an optics experiment, with the position of the object fixed, a student varies the postion of a convex lens and for each position, the screen is adjusted to get a clear image of the object. A graph between the object distance u and the

image distance v, from th elens, is plotted using the same scale for the two axes. A straight line passing through the origin and making an angle 45° with the x-axis meets the experimental curve at P. The coordinated of P will be:

A. $(2f, 2f)$

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

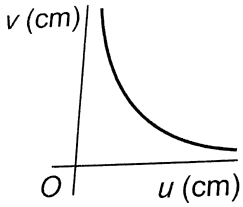
C. (f, f)

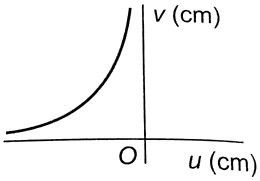
D. $(4f, 4f)$

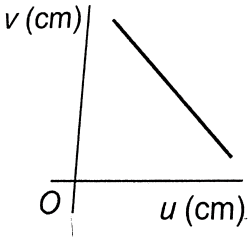
Answer: A

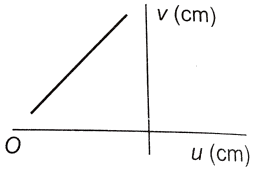
Watch Video Solution

63. A student measures the focal length of a convex lens by putting an object pin at a distance u from the lens and measuring the distance v of the image pin. The graph between u and v plotted by the student should look like

A. 

B. 

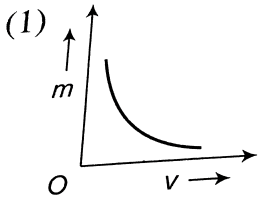
C. 

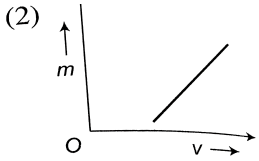
D. 

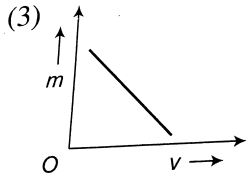
Answer: A

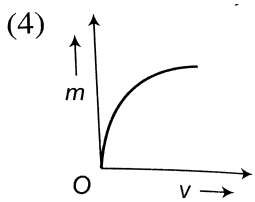
Watch Video Solution

64. The graph between the lateral magnification (m) produced by a lens and the distance of the image (v) is given by

A. 

B. 

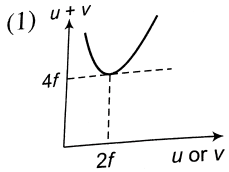
C. 

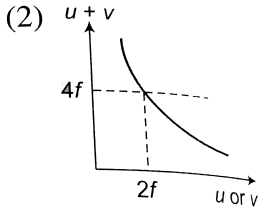
D. 

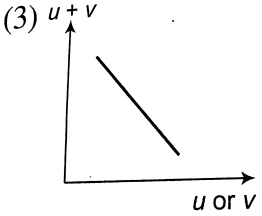
Answer: C

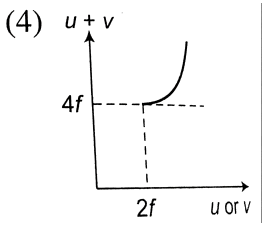
Watch Video Solution

65. For a convex lens, if real image is formed the graph between $(u+v)$ and u or v is as follows

A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

66. Diameter of a plano-convex lens is 6cm and thickness at the centre is 3mm. If speed of light in material of lens is $2 \times 10^8 \frac{m}{s}$, The focal length of the lens is

A. 15 cm, concave

B. 20 cm

C. 30 cm

D. 10 cm

Answer: C

Watch Video Solution

67. 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. $x_1 x_2$

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

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

D. $\sqrt{9} x_1 x_2)$

Answer: D

Watch Video Solution

68. A point object O is placed on the principal axis of a convex lens of focal length $f = 20cm$ at a distance of 40 cm to the left of it. The diameter of the lens is 10. An eye is placed 60 cm to right

of the lens and a distance h below the principal axis. The maximum value of h to see the image is

A. 0

B. 2.5 cm

C. 5 cm

D. 10 cm

Answer: B

Watch Video Solution

69. An illuminated object is placed on the principal axis of a converging lens so the a real image is formed on the other side of the lens. If the object is shifted a little,

A. the image will be shifted simultaneously with the object

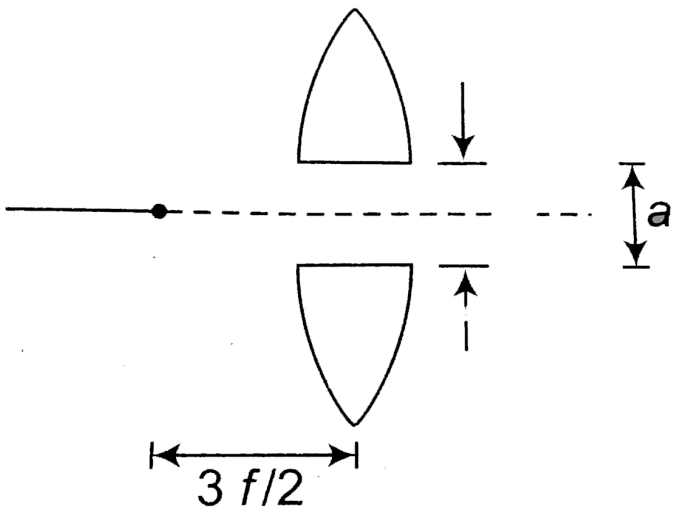
B. the image will be shifted a little later than the object

C. the image will be shifted a little later earlier than the object

D. the image will not shift

Answer: A

Watch Video Solution



70.

A split lens has its two parts separated by a and

its focal length is f. An object is placed at a distance $\frac{3f}{2}$ on the axis of undivided lens as shown. The distance between the virtual source is

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

B. $2a$

C. $3a$

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

Answer: C

Watch Video Solution

71. 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. $\mu_g = \mu_l$

B. $\mu_l < 1$

C. $\mu_l > \mu_g$

D. $\mu_l < \mu_g$

Answer: A

Watch Video Solution

72. A convex lens if in contact with concave lens. The magnitude of the ratio of their focal length is $\frac{2}{3}$. Their equivalent focal length is 30 cm. What are their individual focal lengths?

A. $-75, 50$

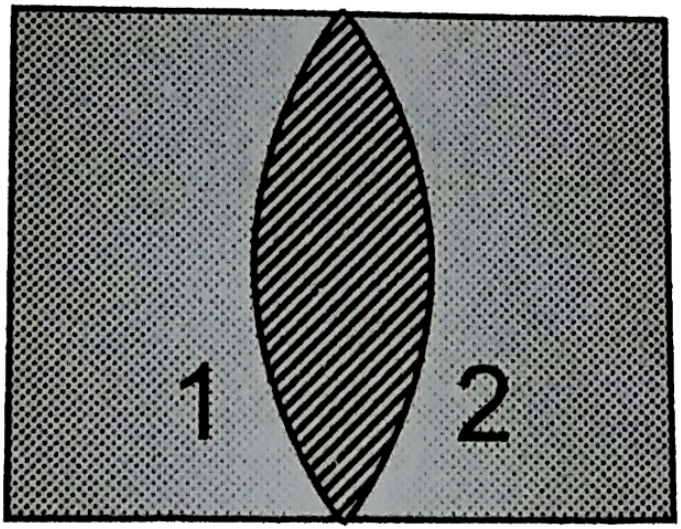
B. $15, -10$

C. $75, 50$

D. $10, -15$

Answer: D

Watch Video Solution



73.

Two plano-concave lenses (1 and 2) of glass of refractive index 1.5 have radii of curvature 25 cm

and 20 cm. They are placed in contact with their curved surface towards each other and the space betweent hem is filled with liquid of refractive index $\frac{4}{3}$ the the combination is

A. convex of focal length 70 cm

B. concave of focal length 70 cm

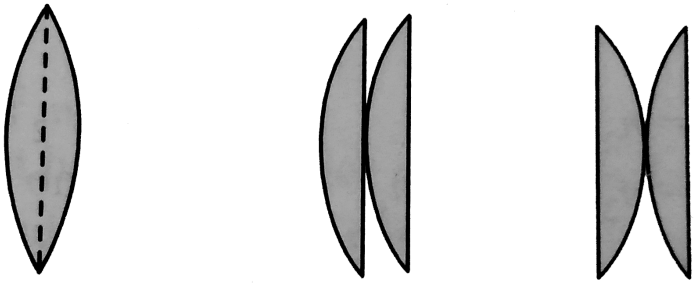
C. concave of focal length 66.6 cm

D. convex of focal length 66.6 cm

Answer: C

Watch Video Solution

74. Two similar planoconvex lenses are combined together in three different ways as shown in the adjoining figure. The ratio of the focal lengths in three cases will be



A. $2:2:1$

B. $1:1:1$

C. $1:2:2$

D. $2:1:1$

Answer: B

Watch Video Solution

75. A convex lens of focal length 40 cm a concave lens of focal length 40 and a concave lens of focal length 15 cm are placed in contact. The power of this combination of are placed in contact. The power of this combination in diopters is

A. $+1.5$

B. -1.5

C. $+6.67$

D. -6.67

Answer: D

Watch Video Solution

76. Two thin lenses of powers $2D$ and $3D$ are placed in contact. An object is placed at a distance of 30 cm from the combination The

distance in cm of the image from the combination is

A. 30

B. 40

C. 50

D. 60

Answer: D

Watch Video Solution

77. 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. is closer to the lens system

B. is farther from the lens system

C. is at the original position

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

Answer: B

Watch Video Solution

78. A beam of parallel rays is brought to focus by a planoconvex lens. A thin Concave lens of the same focal length is joined to the first lens. The effect of this is

A. the focal point shifts away from the lens by a small distance

B. the focus remains undisturbed

C. the focus shifts to infinity

D. the focal point shifts towards the lens by a small distance.

Answer: C

Watch Video Solution

79. A concave lens and a convex lens have same focal length of $20cm$ and both put in contact this combination is used to view an object $5cm$

long kept at $20cm$ from the lens combination. As compared to object the image will be

A. magnified and inverted

B. reduced and erect

C. of the same size as the object and erect

D. of the same size as the object but inverted

Answer: A

Watch Video Solution

80. A bi-convex lens is formed with two thin plano-convex lenses as shown in the figure. Refractive index n of the first lens is 1.5 and that of the second lens is 1.2. Both the curved surface are of the same radius of curvature R=14 cm. For this bi-convex lens, for an object distance of 40 cm, the image distance will be `

A. 20 cm

B. 40 cm

C. 60 cm

D. 80 cm

Answer: B

Watch Video Solution

81. The size of the image of an object, which is at infinity, as formed by a convex lens of focal length 30 cm is 2 cm. If a concave lens of focal length 20 cm is placed between the convex lens and the image at a distance of 26 cm from the convex lens, calculate the new size of the image

A. 1.25 cm

B. 2.5 cm

C. 1.05 cm

D. 2 cm

Answer: B

Watch Video Solution

82. Choose the correct option regarding lenses in contact.

A. When two lenses are placed in contact, the equivalent focal length is $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$

B. When two lenses are placed at a separation d, if object is at ∞, the two lenses can be replaced by a single lens of focal length $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} - \frac{d}{f_1 f_2}$

C. The equivalent lens is to be placed at a distance $\frac{df}{f_1}$ behind second lens

D. all options are correct.

Answer: A

Watch Video Solution

83. A paralel beam of light incident on a concave lens of focal length 10 cm emerges as a parallel beam from a convex lens placed coaxially, the distance between the lenses being 10 cm. The focal length of the convex lens in cm is

A. 10

B. 15

C. 20

D. 30

Answer: C

Watch Video Solution

84. A convex lens A of focal length $20cm$ and a concave lens B of focal length $5cm$ are kept along the same axis with a distance d between them. If a parallel beam of light falling on A and B as a parallel beam, then d is equal to .....cm

A. 25 cm

B. zero

C. 15 cm convex and plane

D. 10 cm

Answer: C

Watch Video Solution

85. Two convex lenses of focal length f_1 and f_2 are mounted coaxially separated by a distance. If the power of the combination is zero, the distance between the lenses is

A. $|f_1 - f_2|$

B. $f_1 + f_2$

C. $\frac{f_1 f_2}{|f_1 - f_2|}$

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

Answer: B

Watch Video Solution

86. A combination of two thin lenses with focal lengths f_1 and f_2 respectively forms and image of distant object at distance $60cm$ when lenses

are in contact. The position of this image shifts by $30cm$ towards the combination when two lenses are separated by $10cm$. The corresponding values of f_1 and f_2 are

A. $30cm, -60cm$

B. $20cm, -30cm$

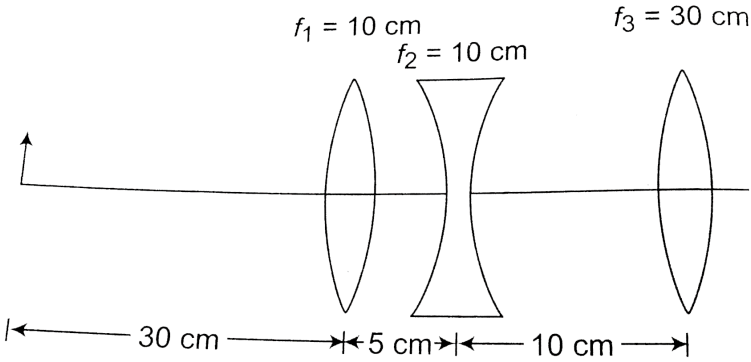
C. $15cm, -12cm$

D. $12cm, -15$

Answer: B

Watch Video Solution

87.



The position of fical image formed by the given lens combination from the third lens will be at a distance of

$f_1 = +10cm, f_2 = -10cm, f_3 = +30$

A. 15 cm, concave

B. infinity

C. 45 cm

D. 30 cm

Answer: D

Watch Video Solution

88. An object is placed $12cm$ to the left of a converging lens of focal length $8cm$. Another converging lens of $6cm$ focal lengh is placed at a distance of $30cm$ to the right of the first lens. The second lens will produce

A. no image

B. a virtual enlarged image

C. a real enlarged image

D. a real smaller image

Answer: C

Watch Video Solution

89. A converging lens forms a real image I on its optic axis. A rectangular galss slab of refractive index μ and thickness t is introduced between the lens and I. I will move

A. away from the lens by $(\mu - 1)$

B. towards the lens by $t(\mu - 1)$

C. away from the lens by $t\left(\frac{\mu - 1}{\mu}\right)$

D. towards the lens by $t\left(\frac{\mu - 1}{\mu}\right)$

Answer: C

Watch Video Solution

90. A lens forms a sharp image on a screen. On inserting a parallel sided glass slab between the lens and the screen, it is found necessary to

move the screen a distance d away the lens in order for the image to be sharp again. If the refractive index of the material of the slab is μ, the thickness of the slab is

A. μd

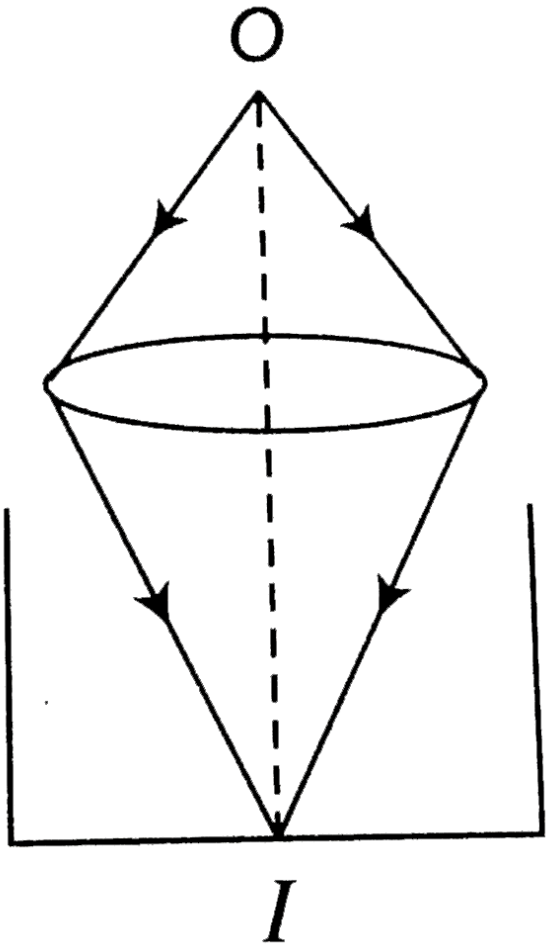
B. $\frac{d}{\mu}$

C. $\frac{\mu - 1}{\mu} d$

D. $\frac{\mu d}{\mu - 1}$

Answer: D

Watch Video Solution



91.

A real image of an object is formed by a conex lens at the bottom of an empty beaker. The beaker is now filled with a liquid of refractive

index 1.4 to a depth of 7 cm. In order to get the image again at the bottom the beaker shoud be moved

A. downward by 2 cm

B. upward by 2 cm

C. downward by 3 cm

D. upward by 3 cm

Answer: A

Watch Video Solution

92. 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: A

Watch Video Solution

93. A concave lens of focal length 20 cm placed in contact with ah plane mirror acts as a convex mirror of focal length

A. convex mirror of focal length 10 cm

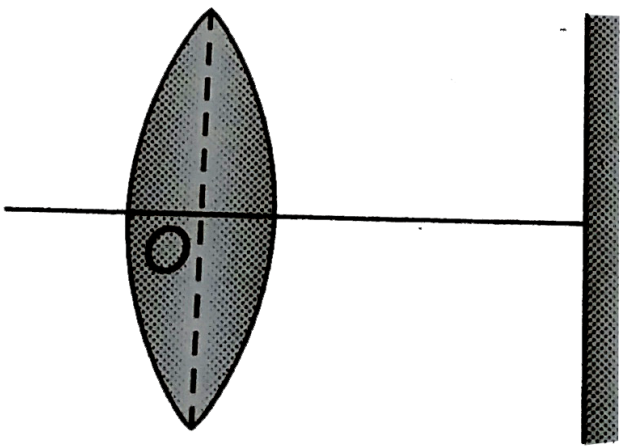
B. concave mirror of focal length 40 cm

C. concave mirror of focal length 60 cm

D. concave mirror of focal length 10 cm

Answer: A

Watch Video Solution



94.

The distance between a convex lens and a plane mirror is 10 cm. The parallel rays incident on the convex lens after reflection from the mirror

forms image at the potical centre of the lens. Focal length of lens will be

A. 10 cm convex and 15 cm concave

B. 20 cm

C. 30 cm

D. cannot be determined

Answer: B

Watch Video Solution

95. A luminous object is placed at a distance of 30 cm from the convex lens, of focal length 20 cm. On the other side of the lens, at what distance from thelens a convex mirror of radius of curvature 10 cm be placed in order to have an image of the object coincident with it

A. 12 cm

B. 30 cm

C. 50 cm

D. 60 cm

Answer: C

Watch Video Solution

96. An object is placed at 15 cm from a convex lens of focal length 10 cm. Where should another convex mirror of radius 12 cm placed such that image will coincide with object.

A. 18 cm

B. 17 cm

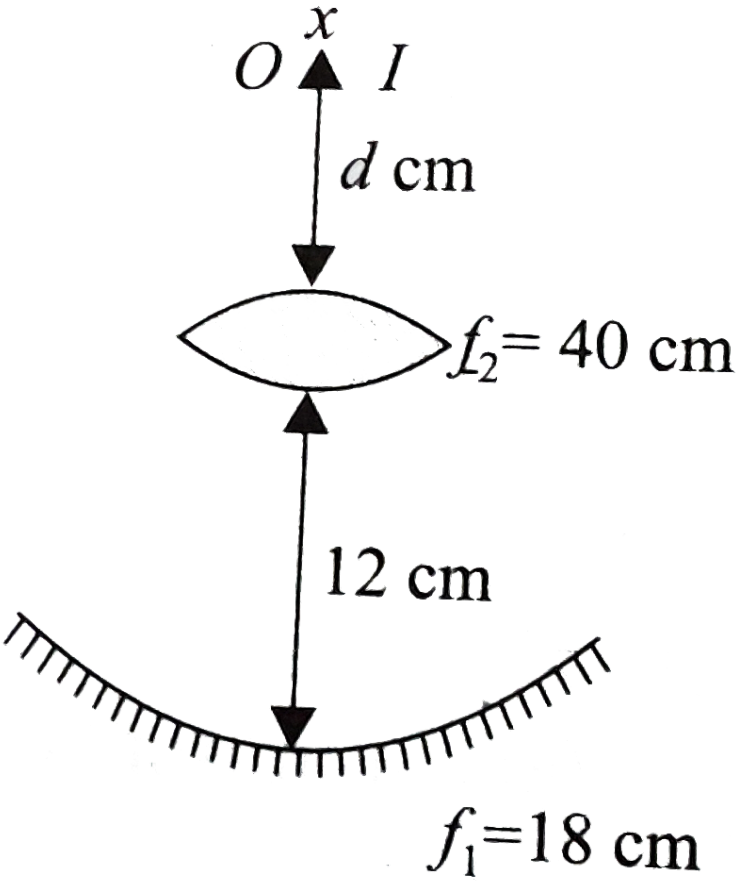
C. 14 cm

D. 20 cm

Answer: A

Watch Video Solution

97. A convex lens of focal length 40cm is held at a distance 12cm coaxially above a concave mirror of focale length 18cm.



Q. A luminous point object placed d cm above the lens on its axis gives rise to an imag coincident iwth itself, then the value of d is equal to

A. 12 cm

B. 15 cm, convex

C. 18 cm

D. 30 cm

Answer: B

Watch Video Solution

98. The focal length of a plano-convex lens is f and its refractive index is 1.5 it is kept over a plane galss plate with its curved surface

touching the glass plate. The gap between the lens and the glass plate is filled by a liquid. As a result the effective focal length of the combination becomes $2f$. Then the refractive index of the liquid is

A. 1.5

B. 2

C. 1.25

D. 1.33

Answer: C

Watch Video Solution

99. An equi-convex lens, having radius of curvature 33 cm is placed on a horizontal plane mirror and a pin held 20 cm above the lens coincides with its image. Now the space between the and the mirror is filled with a liquid in order to coicide with the image the pin has to be raised by 5 cm. The refractive index of the liquid is

A. 1.33

B. 1.53

C. 2.33

D. 2.66

Answer: A

Watch Video Solution

100. A convex lens of focal length 15 cm is placed on a plane mirror. An object is placed 20 cm from the lens. The image is formed

A. 12 cm in front of the mirror

B. 60 cm behind the mirror

C. 60 cm in front of the mirror

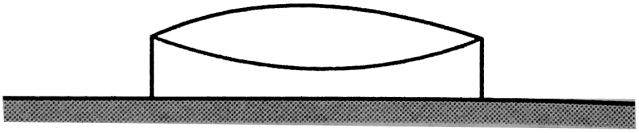
D. 30 cm in front of the mirror

Answer: A

Watch Video Solution

101. A convex lens is placed in contact with a mirrorr as shown. If he space between them is

filed with water, its power will



A. decrease

B. increase

C. remain unchanges

D. can increse or decrease depending on the focal length

Answer: A

Watch Video Solution

102. A plano-convex lens when silvered on the plane side behaves line a concave mirror of focal length 60 cm. However when silvered on the convex side it behaves like a concave mirror of focal length 20 cm. Then the refractive index of the lens

A. 3

B. 1.5

C. 1

D. 2

Answer: B

Watch Video Solution

103. A plano-convex lens of focal length 30 cm has its plane surface silvered. An object is placed 40 cm from the lens on the convex side. The distance of the image from the lens is

A. 18 cm

B. 24 cm

C. 30 cm

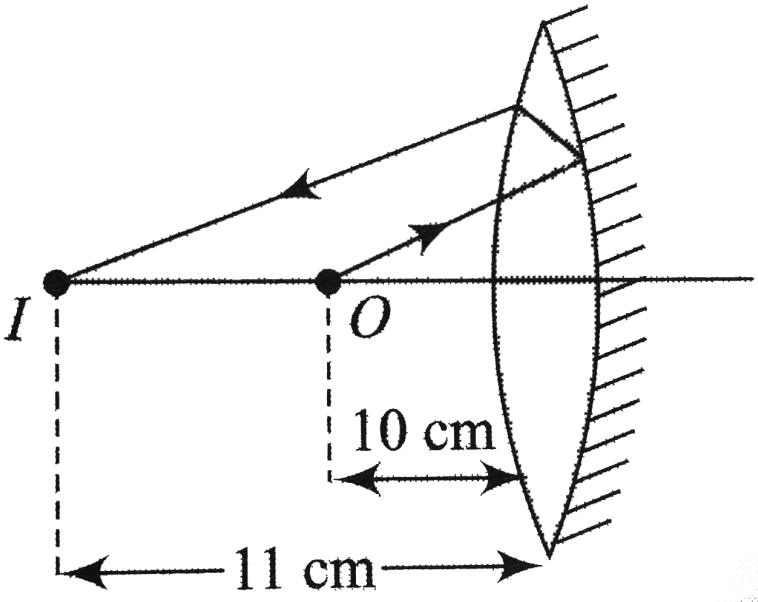
D. 40 cm

Answer: B

Watch Video Solution

104. A pin is placed 10cm in front of a convex lens of focal length 20cm, made of a material having refractive index 1.5 . The surface of lens farther away from the pin is silvered and has a radius of curvature 22cm. Determine the position of the

final image. Is the image real or virtual?



A. 11cm, virtual

B. 11 cm, ral

C. 21 cm, virtual

D. 21 cm, real

Answer: B

Watch Video Solution

105. A plano convex lens of refractive index 1.5 and radius of curvature 30cm. Is silvered at the curved surface. Now this lens has been used to form the image of an object. At what distance from this lens an object be placed in order to have a real image of size of the object.

A. 20 cm

B. 30 cm

C. 60 cm

D. 80 cm

Answer: A

Watch Video Solution