DPP 06

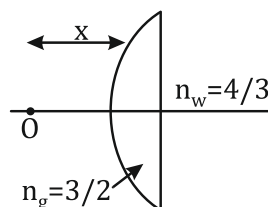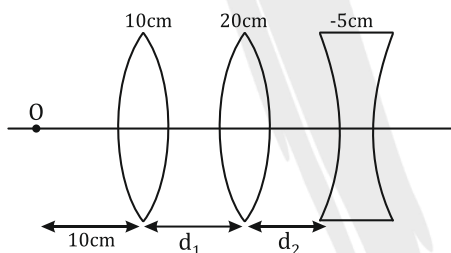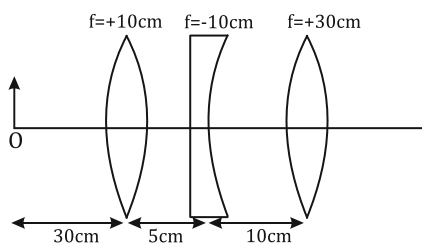## Lens

1. An object ' O ' is kept in air in front of a thin plano convex lens of radius of curvature 10 cm. It's refractive index is 3/2 and the medium towards right of plane surface is water of refractive index 4/3. What should be the distance ' x ' of the object so that the rays become parallel finally.

2. A pencil of height 1 cm is placed 30 cm from an equiconvex lens, refractive index n = 3/2, radius of curvature for both the surfaces, $R_1 = R_2 = R = 10$ cm. Find the location of the image.

3. The power of a lens (biconvex) is 1.25 m^{-1} in particular medium. Refractive index of the lens is 1.5 and radii of curvature are 20 cm and 40 cm respectively. The refractive index of surrounding medium

4. The values of d_1 and d_2 for final rays to be parallel to the principal axis are: (focal lengths of the lenses are written on the lenses)

    (A) $d_1 = 10$ cm, $d_2 = 15$ cm　　　　　(B) $d_1 = 20$ cm, $d_2 = 15$ cm
    (C) $d_1 = 30$ cm, $d_2 = 15$ cm　　　　　(D) None of these

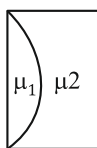5. Find the distance of the image from object O, formed by the combination of lenses in the figure.

    (A) 75 cm　　　　(B) 10 cm　　　　(C) infinity　　　　(D) 20 cm
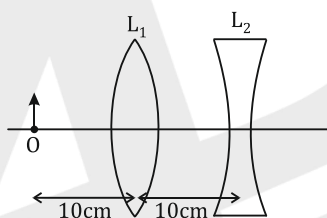
6. Curved surfaces of a plano-convex lens of refractive index μ_1 and a plano-concave lens of refractive index μ_2 have equal radius of curvature as shown in figure. Find the ratio of radius of curvature to the focal length of the combined lenses.
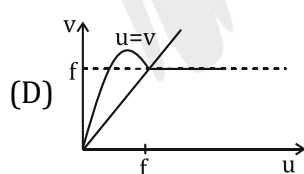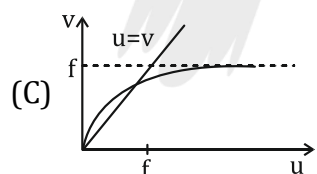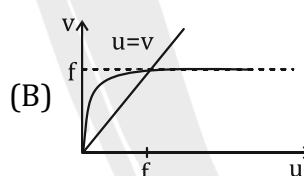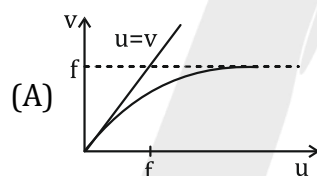

(A) $\dfrac{1}{\mu_2 - \mu_1}$ (B) $\dfrac{1}{\mu_1 - \mu_2}$ (C) $\mu_2 - \mu_1$ (D) $\mu_1 - \mu_2$

7. An extended object is placed at point O, 10 cm in front of a convex lens L_1 and a concave lens L_2 is placed 10 cm behind it, as shown in the figure. The radii of curvature of all the curved surfaces in both the lenses are 20 cm. The refractive index of both the lenses is 1.5. The total magnification of this lens system is

(A) 0.4   (B) 0.8   (C) 1.3   (D) 1.6

8. For a concave lens of focal length f, the relation between object and image distances u and v, respectively, from its pole can best be represented by (u = v is the reference line)

9. What is the position and nature of image formed by lens combination shown in figure? (f_1, f_2 are focal lengths.)
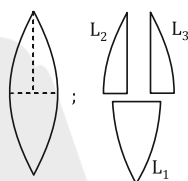

(A) 70 cm from point B at right; real   (B) $\dfrac{20}{3}$ cm from point B at right, real

(C) 40 cm from point B at right, real   (D) 70 cm from point B at left, virtual

10.   An object is at a distance of 20 m from a convex lens of focal length 0.3 m. The lens forms an image of the object. If the object moves away from the lens at a speed of 5 m/s, the speed and direction of the image will be
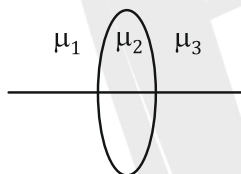
(A) 2.26×10^{-3} m/s away from the lens   (B) 3.22×10^{-3} m/s towards the lens

(C) 1.16×10^{-3} m/s towards the lens   (D) 0.92×10^{-3} m/s away from the lens

11.   A convex lens has power P. It is cut into two halves along its principal axis. Further one piece (out of the two halves) is cut into two halves perpendicular to the principal axis (as shown in figure). Choose the incorrect option for the reported pieces.

(A) Power of $L_1 = \dfrac{P}{2}$ (B) Power of $L_2 = \dfrac{P}{2}$

(C) Power of $L_3 = \dfrac{P}{2}$ (D) Power of $L_1 = P$

12.   The diagram shows an equiconvex lens. What should be the condition on the refractive indices so that the lens become diverging?

ANSWER KEY

1.	-20	**2.**	15	**3.**	$\frac{9}{7}$		
4.	(A, B, C)	**5.**	(A)	**6.**	(D)	**7.**	(B)
8.	(A)	**9.**	(A)	**10.**	(C)	**11.**	(A)
12.	$2\mu_2 < \mu_1 + \mu_3$						

Home Work

Ex. 1	Q.1,20,
Ex. 2	Q.1,5,7,8,11,23
Ex.3	Q.4,5,6,7,10,
Ex.4	Q. 1,2,3,
Ex.5	Q. 10,11,12