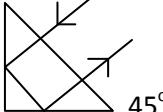
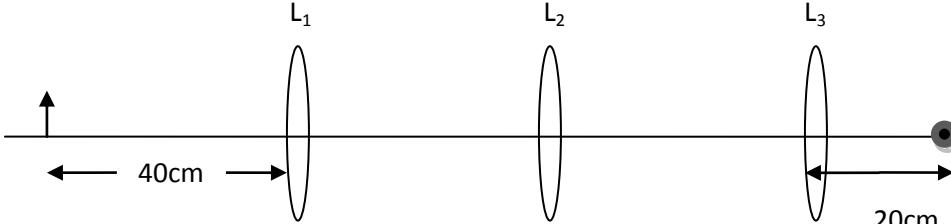


**CH 9 - RAY OPTICS**  
**PRACTICE SHEET**

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No.	Questions	Hints
1	Will the reflected rays converge at a point when a parallel beam of light is incident on a concave mirror of large aperture ?	aberration
2	Two concave mirrors have the same focal length but the aperture of one of them is larger than the other. Which mirror forms a sharper image and why ?	aberration
3	For the same angle of incidence, the angle of refraction in three different media A,B and C are $15^\circ$ , $25^\circ$ and $35^\circ$ respectively. In which medium the speed of light is minimum ?	Snell's law
4	A concave mirror of focal length 20cm in air is placed in a liquid of refractive index 1.33. What happens to its focal length?	Law of reflection
5	Is it possible to have a double convex lens of focal length $f$ in air, same as that of its radii of curvature ?	Give a try
6	What happens to the frequency and wavelength of light when it passes from a rarer to a denser medium ?	Easy one
7	The critical angle for glass – air interface is $i_c$ . Will the critical angle for glass-water interface be greater or less than $i_c$ ?	$i_c = ?$
8	Can a convex lens behave as a concave lens ? Justify	Yes, of-course
9	The radii of curvature of both the surfaces of a lens are equal. If one of the surface is made plane by grinding, how does the focal length and power changes ?	$R = \infty$
10	A beam of light converges to a point P. A parallel sided glass slab is introduced to the path of the converging beam. How will be the point of convergence be shifted ?	Think !
=11	What type of a lens is an air bubble formed inside water ? Give reason	Think !
12	The image of a candle is formed by a convex lens on a screen. If the lower half of the lens is painted black to make it completely opaque, what happens to the size of the image ?	Think !
13	What is the focal length and power of a rectangular glass slab ?	Think !
14	What happens to the focal length of a convex lens when it is immersed in water ?	Think !
15	Two thin lenses of power 2D and 5D are placed in contact axially . Will the focal length of the combination increase / decrease ?	Easy one
16	What happens to the focal length of a convex lens when monochromatic red light is replaced by monochromatic violet ?	Decreases, but why?
17	How is the refractive index of a medium related to the wavelength of incident light ?	* Cauchy's formula
18	Why does the sky appear blue ? What will it look like from the surface of the moon ?	recollect class 10 days
19	An object is first seen in red light and then in violet light through a simple microscope. In which case the magnifying power of the microscope is greater ?	Go back to Q.16
20	Why can't we use a microscope to see a distant object, even though the working principle for a telescope and microscope is the same.	Lenses ?
21	Two lens of focal lengths 5cm and 50cm are used for making a telescope. Which lens should be used as the objective?	Easy one
22	What is the ratio of velocity of light having wavelengths $4000\text{\AA}$ and $8000\text{\AA}$ in vacuum?	Easy one
23	Distinguish between angular dispersion and dispersive power of a prism.	* See Reference Book
24	The refractive index of the material of a convex lens is $n_1$ . It is immersed in a liquid of refractive index $n_2$ . A parallel beam of light is incident on the lens. Trace the path of the emergent rays when i) $n_1 < n_2$ ii) $n_1 = n_2$ iii) $n_1 > n_2$	Give a try
25	Can a virtual image act as a real object ? Justify	Yes
26	Write the conditions for i)deviation without dispersion ii)dispersion without deviation	* See Reference Book
27	Show that, a convex mirror always produces a virtual image, independent of the position of the object.	Use mirror equation
28	What is light ? ( don't try to answer )	Nobody knows till now !

NUMERICALS		
No.	Questions	Answers
1.	The absolute refractive index of glass is 1.52 and that for water is 1.33. Find the refractive index of glass with respect to water. Also find the ratio of speed of light in glass to that in water.	1.14
2	A beam of light converges to a point P. Now a lens is placed in the path of the beam 12 cm from P. At what point does the beam converge if the lens is: a) a convex lens of focal length 20cm b) a concave lens of focal length 16cm	a) 7.5cm behind the lens b) 48cm behind the lens
3	What is the critical angle of a material having refractive index $\sqrt{2}$ ?	45°
4	A mark is made on the bottom of a beaker and a microscope is focused on it. The microscope is raised through 1.5cm. To what height water must be poured into the beaker to bring the mark again to the focus ? RI of water = 4/3	6 cm
5	A convex lens of focal length 0.2m and made of glass(RI = 1.50) is immersed in water (RI = 1.33). Find the change in focal length of the lens.	0.45 cm
6	A beaker of depth 20cm is half filled with an oil of RI 1.4 and the other half with water(RI = 1.33). Calculate the apparent depth of the tank when viewed normally.	14.6 cm
7	A biconvex lens has a focal length half the radius of curvature of either side. What is the refractive index of the material of the lens ?	2
8	What is the minimum value of the refractive index of the prism in the figure ?	$\sqrt{2}$
		
9	You are given 3 lenses $L_1$ , $L_2$ and $L_3$ each of focal length 20cm. An object is placed at 40 cm in front of $L_1$ as shown. The final image is formed at the focal point I of $L_3$ . Find the separation between $L_1$ , $L_2$ and $L_3$	$L_1 - L_2 = 60 \text{ cm}$ $L_2 - L_3 = \text{any value between } 0 \text{ and } \infty$
		
10	A convex lens of focal length 20cm, has a point object placed on its principle axis at a distance of 40 cm from it. A plane mirror is placed 30 cm behind the convex lens. Locate the position of the image formed by the combination.	20 cm behind the lens
11	A convex lens is placed in contact with a plane mirror. An axial point object at a distance of 20cm from this combination has its image coinciding with itself. What is the focal length of the convex lens ?	20 cm
12	A plane mirror is placed at a distance of 10cm behind a concave lens. A point object is placed at a distance of 60cm in-front of the lens. The image formed by the combination is 30cm behind the mirror. What is the focal length of the lens ?	-30 cm
13	A ray of light is incident at an angle 60° on one face of a rectangular glass slab of thickness 0.1m and RI 1.5. Calculate the lateral shift produced.	5.2 cm
14	A screen is placed 90cm from an object. The image of the object on the screen is formed by a convex lens at its two different positions separated by a distance of 20cm. Determine the focal length of the lens.	21.3 cm
15	A compound microscope consists of an objective lens of focal length 2cm and an eyepiece of focal length 6.25cm separated by a distance of 15cm. How far from the objective should an object be placed in order to obtain the final image at a) near point b) infinity	a) -2.5 cm b) -2.59 cm