



INDIAN SCHOOL MUSCAT

Department of Physics

Class : XI Physics Worksheet - 11

Chapter 16 : Ray Optics

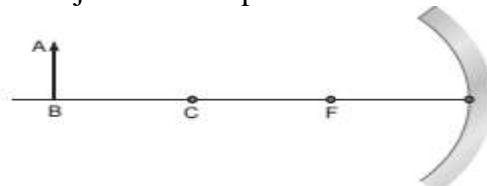
Section A Conceptual and application type questions

- | | | |
|----|--|---|
| 1 | State the conditions required for total internal reflection to take place. | 1 |
| 2 | Mention the advantages of total reflecting prisms over plane mirrors in optical instruments? | 1 |
| 3 | Name two factors on which lateral displacement in a transparent slab depends. | 1 |
| 4 | Parallel rays of red and blue wavelengths enter a convex lens , Will they converge at the same point? Justify. | 1 |
| 5 | A glass lens of refractive index 1.5 is placed in a trough of liquid. What must be the refractive index of the liquid in order to make the lens disappear? | 1 |
| 6 | Define absolute refractive index of a medium | 1 |
| 7 | Out of blue and red light which is deviated more by a prism? Give reason. | |
| 8 | Show that the radius of curvature of a spherical mirror is twice the focal length of the spherical mirror. | 2 |
| 9 | Define critical angle and derive a relation between critical angle and refractive index of a medium. | 2 |
| 10 | With the help of a suitable ray diagram, derive the mirror formula for a concave mirror forming a real image. | 3 |
| 11 | Draw a labelled ray diagram to show the formation of final image at near point in an astronomical telescope for a distant object.
Write the expression for its magnification Power. | 3 |

- 12 Draw a ray diagram to show refraction of a ray of monochromatic light passing through a glass prism. Deduce the expression for the refractive index of glass in terms of angle of prism and angle of minimum deviation. 3
- 13 (a) Obtain lens makers formula using the expression 3
- $$\frac{n_2}{v} - \frac{n_1}{u} = \frac{(n_2 - n_1)}{R}$$

Here the ray of light propagating from a rarer medium of refractive index (n_1) to a denser medium of refractive index (n_2), is incident on the convex side of spherical refracting surface of radius of curvature R.

- 14 An object AB is kept in front of a concave mirror as shown in the figure. 3



- (i) Complete the ray diagram showing the image formation of the object.
(ii) How will the position and intensity of the image be affected if the lower half of the mirror's reflecting surface is painted black?

Section B Numerical problems

- 1 Light of wavelength 5000 Å falls on a plane reflecting surface. Calculate the wavelength and frequency of reflected light. For what angle of incidence, the reflected ray is normal to the incident ray? 2
- 2 A biconvex lens has a focal length $2/3$ times the radius of curvature of either surface. Calculate the refractive index of lens material. 2
- 3 A small telescope has an objective lens of focal length 144cm and an eyepiece of focal length 6.0cm. What is the magnifying power of the telescope? What is the separation between the objective and the eyepiece? 2
- 4 You are given following three lenses. Which two lenses will you use as an eyepiece and as an objective to construct i) an astronomical telescope?
ii) compound microscope. 2

Lense	Power in dioptrē	Aperture in cm
L1	3	8
L2	6	1
L3	10	1