



INDIAN SCHOOL DARSAIT
DEPARTMENT OF PHYSICS



Subject : Physics	Topic : RAY <u>OPTICS</u>	Date of Worksheet : 10.10.18
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Name of the Student : _____	Class & Division : XII _____	Roll Number : ____

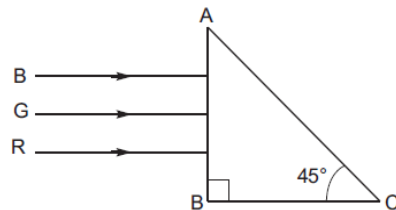
1. When monochromatic light travels from one medium to another its wavelength changes but frequency remains same. Explain.(2011) 1
2. Define refractive index of a transparent medium.(2009) 1
3. How is the focal length of a spherical mirror affected when the wavelength of the light used is increased? (2010) 1
4. A ray of monochromatic light passes from medium (1) to medium (2). If the angle of incidence in medium (1) is θ and the corresponding angle of refraction in medium (2) is $\theta / 2$, which of the two media is optically denser? Give reason. 1
5. How does focal length of a lens change when red light incident on it is replaced by violet light? Give reason for your answer. 1
6. A diverging lens of focal length ' F ' is cut into two identical parts each forming a plano-concave lens. What is the focal length of each part? 1
7. You are given following three lenses. Which two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope? 1

Lenses	Power (P)	Aperture (A)
L_1	3 D	8 cm
L_2	6 D	1 cm
L_3	10 D	1 cm

8. Define the resolving power of a microscope. How is this affected when
(i) the wavelength of illuminating radiations is decreased, and
(ii) the diameter of the objective lens is decreased? Justify your answer. 2
9. (a) Draw a labelled ray diagram of a refraction type telescope in normal adjustment. 3
(b) Give its two shortcomings over reflection type telescope.
(c) Why is eyepiece of a telescope of short focal length, while objective is of large focal length? Explain.

10. (a) Draw a labelled ray diagram of a compound microscope. 3
 (b) Derive an expression for its magnifying power.
 (c) Why is objective of a microscope of short aperture and short focal length? Give reason.

11. Three rays of light, red (R), green (G) and blue (B), are incident on the face AB of a right angled prism, as shown in the figure. The refractive indices of the material of the prism for red, green and blue are 1.39, 1.44 and 1.47 respectively. Which one of the three rays will emerge out of the prism? Give reason to support your answer. 3



12. Draw a plot showing the variation of power of a lens, with the wavelength of the incident light. A converging lens of refractive index 1.5 and of focal length 15 cm in air, has the same radii of curvature for both sides. If it is immersed in a liquid of refractive index 1.7 , find the focal length of the lens in the liquid. 3

13. A thin convex lens having two surfaces of radii of curvature R_1 and R_2 is made of a material of refractive index n_2 . It is kept in a medium of refractive index n_1 . Derive, with the help of a ray diagram, the lens maker formula when a point object placed on the principal axis in front of the radius of curvature R_1 produces an image I on the other side of the lens. 5

14. Draw a labelled ray diagram of a compound microscope and write an expression for its magnifying power. The focal length of the objective and eye-lens of a compound microscope are 2 cm, 6.25 cm respectively. The distance between the lenses is 15 cm. 5
 (i) How far from the objective lens, will the object be kept, so as to obtain the final image at the near point of the eye? (ii) Also calculate its magnifying power.

15. Draw a labelled ray diagram of an astronomical telescope, in the normal adjustment position and write the expression for its magnifying power. 5
 An astronomical telescope uses an objective lens of focal length 15 m and eye-lens of focal length 1 cm. What is the angular magnification of the telescope?
 If this telescope is used to view moon, what is the diameter of the image of moon formed by the objective lens?
 (Diameter of moon $= 3.5 \times 10^6$ m and radius of lunar orbit $= 3.8 \times 10^8$ m).