



**INDIAN SCHOOL DARSAIT  
DEPARTMENT OF PHYSICS**



Subject : PHYSICS	Topic : <u>RAY OPTICS</u>	Date of Worksheet : 11 .10.17
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Name of the Student : _____	Class & Division : _____	Roll Number : ____

**ONE MARK QUESTIONS-**

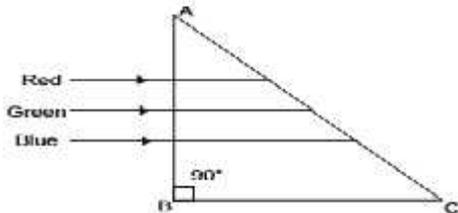
1. A glass lens of refractive index 1.5 is placed in a trough of liquid. What must be the refractive index of the liquid in order to make the lens disappear?
2. How does the power of a convex lens vary, if the incident red light is replaced by violet light?
3. An object is held at the principal focus of a concave lens of focal length  $f$ . Where is the image formed?
4. 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?
5. For which colour the refractive index of prism material is maximum and minimum?
6. Calculate the speed of light in a medium whose critical angle is  $30^\circ$ .
7. Find the radius of curvature of the convex surface of a plano-convex lens, whose focal length is 0.3 m and the refractive index of the material of the lens is 1.5.
8. You are given following three lenses. Which two lenses will you use as an eyepiece and as an objective to construct an astronomical telescope?

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

9. Explain why both the objective and the eye piece of a compound microscope must have short focal lengths.

**TWO MARK QUESTIONS-**

10. A ray of light passing through an equilateral triangular glass prism from air undergoes minimum deviation when angle of incidence is  $\frac{3}{4}$ th of the angle of prism. Calculate the speed of light in the prism.

11.	<p>Draw a ray diagram of an astronomical telescope in the normal adjustment position. State two drawbacks of this type of telescope.</p> <p style="text-align: center;"><b>(OR)</b></p> <p>Draw a ray diagram of a compound microscope. Write the expression for its magnifying power.</p>
12.	Calculate the distance of an object of height $h$ from a concave mirror of focal length 10 cm, so as to obtain a real image of magnification 2.
13.	The image obtained with a convex lens is erect and its length is four times the length of the object. If the focal length of the lens is 20 cm, calculate the object and image distances.
14.	<p>In the figure given below, light rays of blue, green, red wavelengths are incident on an isosceles right-angled prism. Explain with reason, which ray of light will be transmitted through the face AC. The refractive index of the prism for red, green, blue light are 1.39, 1.424, and 1.476 respectively.</p> 
15.	A convex lens of focal length 10 cm is placed coaxially 5 cm away from a concave lens of focal length 10 cm. If an object is placed 30 cm in front of the convex lens, find the position of the final image formed by the combined system.
16.	(a) The bluish colour predominates in clear sky. (b) Violet colour is seen at the bottom of the spectrum when white light is dispersed by a prism. State reason to explain these observations.
<b>THREE MARK QUESTIONS-</b>	
17.	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.
18.	The focal length of the objective and eye-lens of a compound microscope are 2 cm, 6.25cm respectively. The distance between the lenses is 15 cm. (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.
19.	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).
20.	State the conditions under which total internal reflection occurs. One face of a prism with a refracting angle of $30^\circ$ is coated with silver. A ray incident on another face at an angle of $45^\circ$ is refracted and reflected from the silver coated face and retraces its path. Find the refractive index of the material of the prism.