

WORKSHEET (Ray and Wave Optics)

CLASS - XII

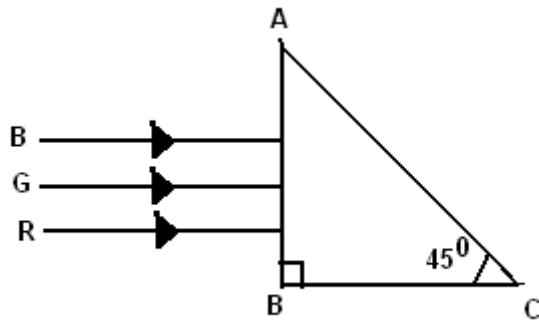
1. Why does the bluish colour predominate in the sky?
2. The refractive index of a material of a concave lens is n_1 . It is immersed in a medium of refractive index n_2 . A parallel beam of light is incident on the lens. Trace the path of the emergent rays when $n_1 > n_2$.
3. A converging and diverging lens of equal focal lengths are placed co-axially in contact. Find the power and the focal length of the combination.
4. The radii of curvature of both the surfaces of a lens are equal. If one of the surface is made plane by grinding, will the focal length and the power change?
5. Write thin lens formula for a convex lens and draw the graph showing the variation of u and v for a convex lens.
6. Draw a schematic diagram of a reflecting telescope. Write two important advantages that a reflecting telescope has over refracting telescope.
7. A ray of light falls on a triangular prism in such a way that the deviation of the emergent ray is minimum for the prism. Draw the ray diagram for this case and write the relation between the angle of incidence and the angle of emergence.
8. The radii of curvature of the faces of a double convex lens are 10 cm and 15 cm. Its focal length is 12 cm. What is the refractive index of glass? A convex lens has 20 cm focal length in air. What is the focal length in water? (refractive index of air-water = 1.33, refractive index for air-glass = 1.5)
9. Four double convex lenses, with the following specifications are available:

Lens	Focal length	Aperture
A	100 cm	10 cm
B	100 cm	5 cm
C	10 cm	2 cm
D	5 cm	2 cm

Which of the two given four lenses, should be selected as the objective and eyepiece to construct an astronomical telescope and why? What will be the magnifying power and normal length of the telescope tube so constructed?

10. Prove the laws of reflection on the basis of wave theory of light. State and explain Huygen's principle.
11. What is the cause of dispersion?
12. The refractive index of a material of a convex lens is n_1 . It is immersed in a medium of refractive index n_2 . A parallel beam of light is incident on the lens. Trace the path of the emergent rays when $n_2 > n_1$.
- 13(a) Write the conditions for total internal reflection to take place.
(b) Calculate the speed of light in the medium whose critical angle is 45° .
14. The focal length of an equi-convex lens is equal to the radii of curvature of either face. What is the refractive index of the material of the lens?

15. What is meant by power of a lens? Draw a plot showing the variation of a power of a lens, with the wavelength of incident light.
16. Draw a labelled diagram of a refracting telescope. Define its magnifying power and write the expression for it.
17. Three rays of light - red (R), green (G) and blue (B) are incident on the face AB of a right - angled prism ABC. The refractive indices of the material of the prism for red, green and blue wavelengths are 1.39, 1.44 and 1.47 respectively. Out of the three, which colour ray will emerge out of face AC? Justify your answer. Trace the path of these rays after passing through face AB.



18. A double convex lens has 10 cm and 15 cm as its two radii of curvatures. The image of an object placed 30 cm from the lens, is formed at 20 cm from the lens on the other side. Find the refractive index of the material of the lens. What will be the focal length? What will be the focal length of the lens, if it is immersed in water of refractive index 1.33 cm?
19. A convex lens of focal length f_1 is kept in contact with a concave lens of focal length f_2 . Find the focal length of the combination.
20. Prove the laws of refraction on the basis of wave theory. State important conditions for obtaining sustained interference pattern.
