



INDIAN SCHOOL NIZWA - WORKSHEET

PHYSICS

CH: 10 WAVE OPTICS

Name: _____

Date: _____

Class: XII Sec: A ____

1. Do the frequency and wavelength change when light passes from a rarer medium to a denser medium?
Ans. Wavelength changes but frequency does not change.
2. Does the critical angle depend on colour of light? Explain
Ans. Yes. As $i_c = 1/\mu$, i_c depends on μ , but μ depends on wavelength. Hence it depends on the colour of light.
3. A water tank is 4m deep. A candle flame is held 6m above the water level. For water $\mu = 4/3$. Where will the image of the candle flame be formed?
Ans. The image of the flame is formed due to reflection from water surface and not by refraction. The water surface acts like a plane mirror. The virtual image of flame is formed 6m below the water surface.
4. A fish in a water tank sees the outside world as if it is at the vertex of a cone whose circular base is at the surface of water. If the depth of the fish is d and the critical angle for water – air interface is i_c , what is the radius of the circle?
Ans. Radius, $r = d \tan i_c$.
5. When does a convex lens behave like a concave lens?
Ans. When the lens is placed inside a transparent medium of refractive index greater than that of its own material, it behaves as a concave lens.
6. A lens of glass is immersed in water, what will be its effect on the power of the lens?
Ans. Power of a lens $P \propto (\mu - 1)$. As $\mu_g < \mu_w$, so power of glass will decrease when it is immersed in water.
7. How does the focal length of a convex lens change if monochromatic red light is used instead of violet light?
Ans. Focal length $f \propto 1/(\mu - 1)$. As $\mu_r < \mu_v$ focal length will increase when red light is used.
8. A screen is placed 90 cm from an object, the image of the object on the screen is formed by a convex lens at two different positions separated by 20cm. Determine the focal length of the lens.
9. The focal length of an equiconvex lens is equal to the radius of curvature of either face. What is the value of refractive index of the material of the lens?
10. 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 (i) $n_2 = n_1$ (ii) $n_2 > n_1$ (iii) $n_2 < n_1$.



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11. A concave lens of refractive index 1.5 is immersed in a medium of refractive index 1.65. What is the nature of the lens?
12. Under what condition does a biconvex lens of glass having same refractive index act as a plane glass sheet when immersed in liquid?
13. A converging lens of refractive index 1.5 is kept in a medium having same refractive index. What is the focal length of the lens in medium?
14. Out of the blue and red light which is deviated more by the prism? Give reason.
15. A ray of light passes through glass prism such that the angle of incidence is equal to angle of emergence and each of these angles is equal to $\frac{3}{4}$ of angle of prism. What is the value of angle of deviation?