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Answers to NCERT/CBSE PHYSICS Class 12(Class XII)textbook Exercise and Additional exercise

CHAPTER Nine

Ray Optics

EXERCISES

- 9.6** A prism is made of glass of unknown refractive index. A parallel beam of light is incident on a face of the prism. The angle of minimum deviation is measured to be  $40^\circ$ . What is the refractive index of the material of the prism? The refracting angle of the prism is  $60^\circ$ . If the prism is placed in water (refractive index 1.33), predict the new angle of minimum deviation of a parallel beam of light.

9.6  $D = 40^\circ$

$A = 60^\circ$

$$\frac{n}{1} = \frac{\sin\left(\frac{A+D}{2}\right)}{\sin\frac{A}{2}} = \frac{\sin 50^\circ}{\sin 30^\circ} = \frac{0.766}{0.5} \quad (1)$$

when prism is laced in water then

$$\frac{n}{1.33} = \frac{\sin\frac{A+D}{2}}{\frac{A}{2}} = \frac{\sin 50^\circ}{\sin 30^\circ} = \frac{0.766}{0.5} \quad (2)$$

Combining equations (1) and (2), we get  $\frac{0.766}{0.5} \times \frac{1}{1.33} \times 0.5 = \sin\left(\frac{60+D}{2}\right)$

$$0.576 = \sin\left(\frac{60+D}{2}\right)$$

$$35^\circ 12' = \frac{60+D}{2}$$

$$10^\circ 24' = D$$

For  $\sin^{-1}(0.576)$ , look up trigonometric tables.