

Answer on Question 60872, Physics, Optics

Question:

Light travels from crown glass ($n_1 = 1.52$) into air ($n_2 = 1.0$). The angle of refraction in air is 60° . What is the angle of incidence in glass?

Solution:

In this question we are dealing with the famous Snell's Law. It states that the ratio of the sines of the angles of incidence and refraction is equivalent to the reciprocal of the ratio of the indices of refraction of the two media. Mathematically, it can be written as follows:

$$\frac{\sin\theta_1}{\sin\theta_2} = \frac{n_2}{n_1},$$

here, θ_1 is the angle of incidence, $\theta_2 = 60^\circ$ is the angle of refraction, $n_1 = 1.52$ is the refractive index of crown glass, $n_2 = 1.0$ is the refractive index of air.

Then, from the last formula we can find the angle of incidence in glass θ_1 :

$$\sin\theta_1 = \frac{n_2}{n_1} \sin\theta_2,$$

$$\theta_1 = \arcsin\left(\frac{n_2}{n_1} \sin\theta_2\right) = \arcsin\left(\frac{1.0}{1.52} \sin 60^\circ\right) = 34.7^\circ.$$

Answer:

$$\theta_1 = 34.7^\circ.$$