A ray of light is incident at 60^o on a prism of refracting angle 30^o. The emerging ray is at an angle 30^o with the incident ray. The value of refractive index of the prism is?

A $\frac{\sqrt{3}}{4}$

B $\frac{\sqrt{3}}{2}$

C $\sqrt{3}$

D $\frac{2}{\sqrt{3}}$

Solution

Correct option is C)

angle of prism A is 30

angle of incidence is 60 degree

angle of deviation is 30 degree

$i_1 + i_2 = A + \delta$

the angle of emegrance

$i_2 = A + \delta - i_1 = 30 + 30 - 60 = 0$

'the emergent ray

$r_1 + r_2 = A$

$i_2 = 0, r_2 = 0$

$r_1 = A = 30^0$

using snells law

$$n = \frac{\sin\ i_1}{\sin\ r_1} = \frac{\sin\ 60}{\sin\ 30} = 1.732$$

since emergent ray is normal

$\delta = \delta_m = 30^0$

$$\frac{\sin(30 + 30/2)}{\sin 30/2} = 1.732$$