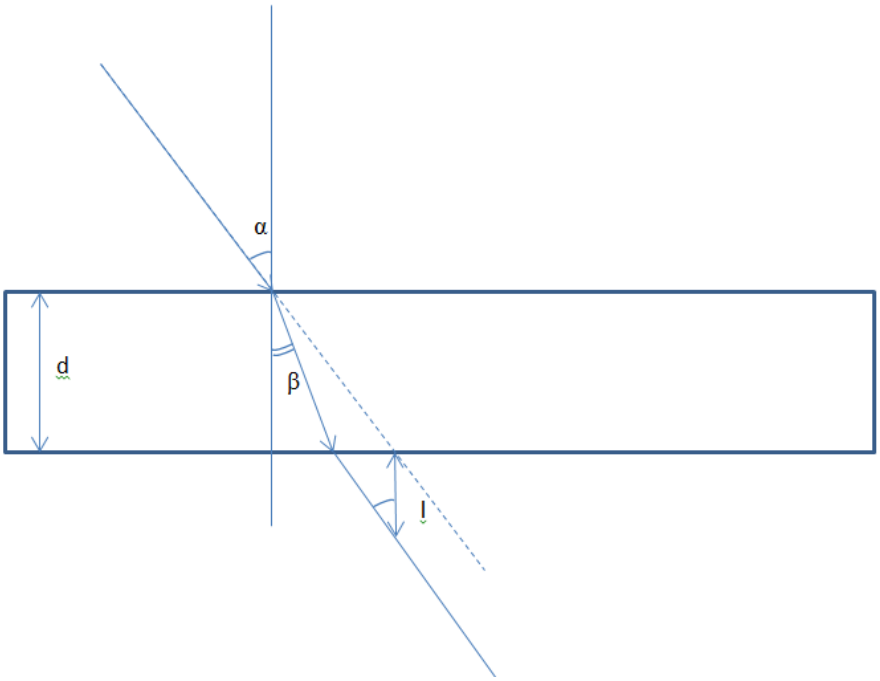
Answer on Question#38973 – Physics -- Optics

While a moving picture is being screened, a boy introduced a glass slab of thickness 3 cm and refractive index 1.5 between the projector and the screen. In order to have a clear picture on the screen, the screen should be moved through a distance of

(1) 1 cm away
(2) 1 cm nearer
(3) 2 cm away
(4) 3 cm away

Solution



$d = 3cm$

$n = 1.5$

If angles α, β are small we can use $\frac{1}{n} = \frac{\sin\alpha}{\sin\beta} \approx \frac{\tan\alpha}{\tan\beta} \approx \frac{\alpha}{\beta}$

We can find $l = d(\tan\alpha - \tan\beta)\cot\alpha = d\left(1 - \frac{\tan\alpha}{\tan\beta}\right) \approx d\left(1 - \frac{\alpha}{\beta}\right) = d\left(1 - \frac{1}{n}\right) = 1cm$

Answer:

(1) 1 cm away