

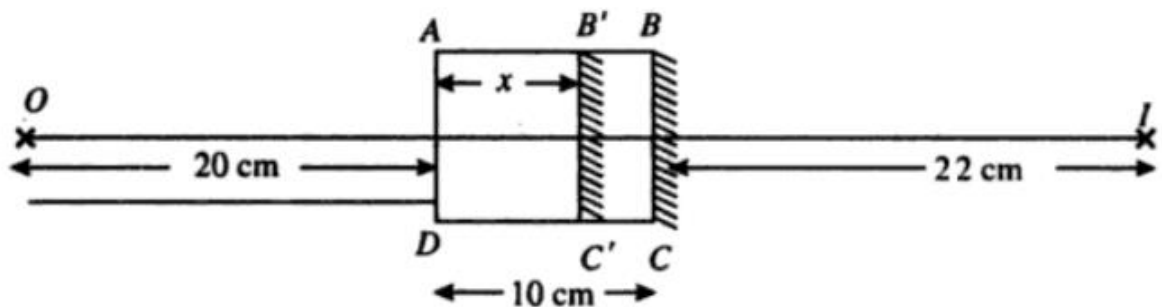
Answer on Question #50100, Physics, Optics

A small object is placed 20 cm in front of a block of glass 10 cm thick and its farther side silvered. The image is formed 22 cm behind the silvered face. Find the refractive index of glass.

Options are

- (a) 1.15
- (b) 1.25
- (c) 1.67
- (d) 1.1

Solution:



The situation is shown in the figure. ABCD is the glass block, O is the object and I is the image. To an observer in front of the face AD, the silvered face BC appears to be shifted to a new position B'C' due to refraction at AD. B'C' act as a plane mirror in which the image I is formed.

Let $AB' = x$. Then, since for a plane mirror the image distance is equal to the object distance from the mirror, we have

$$\begin{aligned} 20 + x &= 22 + 10 - x \\ x &= 6 \text{ cm} \\ \text{Refractive index} &= \frac{\text{Real depth}}{\text{Apparent depth}} = \frac{10}{6} = 1.67 \end{aligned}$$

Answer: (c) 1.67