

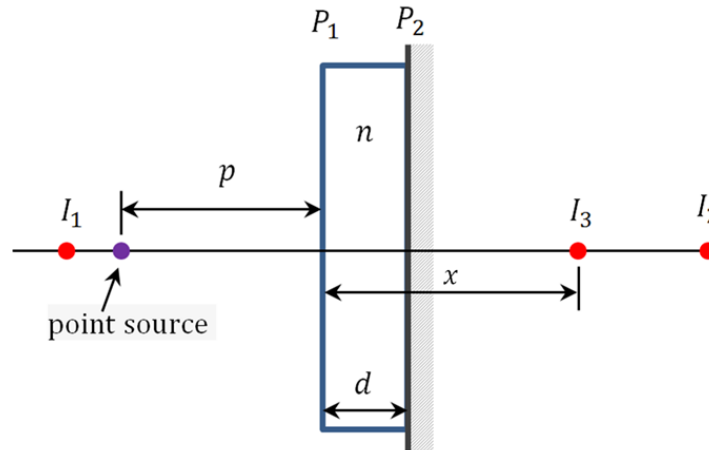
Answer on Question #73942, Physics / Optics

Question. A plane mirror is made of glass slab (refractive index of glass $n = 1.5$) $d = 2.5 \text{ cm}$ thick and silvered on back. A point source is placed $p = 5 \text{ cm}$ front of the unsilvered face of the mirror. What will be the position of final image?

Given. $n = 1.5$; $d = 2.5 \text{ cm}$; $p = 5 \text{ cm}$.

Find. x —?

Solution.



Let

- 1) I_1 is the image formed by refraction from P_1 ;
- 2) I_2 is the image formed by reflection from P_2 ;
- 3) I_3 is the image formed by again refraction from P_1 .

Location of the image I_1

$$\frac{1}{p} = -\frac{n}{q} \rightarrow q = -n \cdot p = -1.5 \cdot 5 = -7.5 \text{ cm from } P_1$$

or

$$7.5 + 2.5 = 10 \text{ cm from } P_2.$$

Location of the image I_2

$$10 \text{ cm behind mirror or } 10 + 2.5 = 12.5 \text{ cm from } P_1.$$

Location of the image I_3

$$\frac{n}{12.5} = \frac{1}{x} \rightarrow x = \frac{12.5}{n} = \frac{12.5}{1.5} = 8.33 \text{ cm from unsilvered face } P_1.$$

Answer. $x = 8.33 \text{ cm from unsilvered face } P_1.$