

Answer on Question #74433, Physics / Optics

Question. A square $ABCD$ of side 1 mm is kept at distance 15 cm in front of the concave mirror. The focal length of the concave mirror is 10 cm . The length of the perimeter of its image will be

- (1) 8mm ;
- (2) 2mm ;
- (3) 12mm ;
- (4) 6 mm .

Given. $h_o = 1\text{ mm}$; $d_o = 15\text{ cm}$; $f = 10\text{ cm}$

Find. p —?

Solution.

For the concave mirror

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f} \rightarrow d_i = \frac{1}{\frac{1}{f} - \frac{1}{d_o}} = \frac{1}{\frac{1}{10} - \frac{1}{15}} = 30\text{ cm}$$

So,

$$\frac{h_i}{h_o} = -\frac{d_i}{d_o} \rightarrow h_i = -h_o \frac{d_i}{d_o} = -1 \cdot \frac{30}{15} = -2\text{ mm}$$

Finally

$$p = 4 \cdot h_i = 4 \cdot 2 = 8\text{ mm}$$

Answer. $p = 8\text{ mm}$.

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