Answer on Question 59784, Physics, Optics

Question:

You have two plane mirrors of sizes $6\ ft$ and $10\ ft$. The focal length of these two mirrors are:

A) $6\ m$ and $10\ m$

B) $3\ m$ and $5\ m$

C) Both of them have zero focal length

D) They have same focal length and is infinity.

Solution:

Let's imagine that we placed an object in front of the plane mirror. Then, according to the Law of Plane Mirrors, an image is formed behind the mirror at a distance equal to the distance of the object from the mirror ($d_i = -d_0$).

Let's write the mirror equation:

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f},$$

here, d_o is the object distance from the mirror, d_i is the image distance from the mirror, f is the focal length of the mirror. From the mirror equation, we can clearly see that the focal length of the plane mirror is equal to infinity:

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f},$$

$$\frac{1}{d_o} - \frac{1}{d_o} = \frac{1}{f},$$

$$f = \infty.$$

Therefore, the correct answer is D) They have same focal length and is infinity.

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