

Answer on Question #57876-Physics-Optics

It is desired to cast the image of a lamp magnified 5 times upon a wall 4 m distant from the lamp. What kind of spherical mirror is required and what is its position?

Solution

Here the distance between the mirror and the image:

$$d_i + d_o = 4$$

The magnification is

$$\frac{d_i}{d_o} = 5$$

So,

$$d_i = 5d_o$$

and,

$$5d_o + d_o = 4$$

or,

$$6d_o = 4$$

Therefore

$$d_o = \frac{2}{3}m \text{ and } d_i = 3\frac{1}{3}m.$$

So, the mirror should be put $\frac{2}{3}$ meters from the lamp and $3\frac{1}{3}$ meters from the wall.

As the image is magnified in a wall, the mirror must be concave mirror. Convex mirrors produce smaller images.