Answer on Question #46573 – Physics – Other

In an experiment with a concave mirror, the image of an optical pin which is 4 times its size was cast on on a screen 6m from the object pin. How far from the object pin should the mirror be placed?

8m
6m
3m
2m

Solution:

$\mathrm{d} = 6\mathrm{m} - \text{distance form object to screen};$
$\mathrm{M} = 4 - \text{optical magnification};$

Optical magnification is the ratio between the apparent size of an object (or its size in an image) and its true size, and thus it is a dimensionless number.

If v is distance from mirror to image and u is distance from object to mirror, then magnification is equal to:

$$\mathrm{M} = \frac{\mathrm{v}}{\mathrm{u}} = \frac{\mathrm{d} - \mathrm{u}}{\mathrm{u}}$$
$$\mathrm{d} - \mathrm{u} = \mathrm{Mu}$$
$$\mathrm{u}(\mathrm{M} + 1) = \mathrm{d}$$
$$\mathrm{u} = \frac{\mathrm{d}}{\mathrm{M} + 1} = \frac{6}{5} = 1.2\ \mathrm{m}$$

Answer: distance from the mirror to the pin is equal to