

Chapter 10

REFLECTION AND REFRACTION

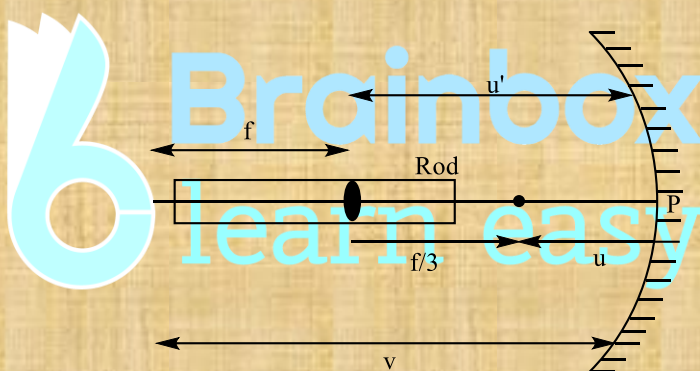
Example- 5:

A thin rod of length $f/3$ is placed along the optical axis of a concave mirror of focal length f such that its image which is real and elongated just touches the rod. Calculate the magnification.

Solution:

Let l be the length of the image, then

$$m = \frac{l}{f/3} \Rightarrow l = \frac{mf}{3}$$



Also image of one end coincides with the object,

$$u' = u + \frac{f}{3} \Rightarrow u = 2f - \frac{f}{3} = \frac{5f}{3}$$

$$v = -\left(u + \frac{f}{3} + \frac{mf}{3}\right)$$

Putting in mirror formula,

$$\frac{1}{u + (f/3) + (mf/3)} + \frac{1}{u} = \frac{1}{f}$$

$$\Rightarrow \frac{3}{5f + f + mf} + \frac{3}{5f} = \frac{1}{f} \Rightarrow \frac{1}{m+6} = \frac{2}{15}$$

$$\Rightarrow m = \frac{3}{2}.$$

