

Chapter 10

REFLECTION AND REFRACTION

Example- 3:

The radius of curvature of a spherical mirror is 30 cm. Find the focal length of this mirror.

Solution:

Here $R = 30 \text{ cm}$

Using, $f = \frac{R}{2}$, we have

$$f = \frac{30 \text{ cm}}{2} = 15 \text{ cm}$$

Thus, focal length of the spherical mirror = 15 cm.

Example- 4:

An object 4.0 cm in size is placed at a distance of 25.0 in front of a convex mirror of radius of curvature 40 cm. Find

- (i) the position,
- (ii) the size and
- (iii) nature of the image.

Solution:

Here,

$$h = + 4.0 \text{ cm}$$

$$U = -25.0 \text{ cm} \quad (\text{sign conversions})$$

$$R = + 40 \text{ cm}$$

$$\therefore f = \frac{R}{2} = \frac{40}{2} = 20.0 \text{ cm}$$

(i) Determination of the position of the image.

Using, $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$, we get

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{20} - \frac{1}{(-25)} = \frac{1}{20} + \frac{1}{25} = \frac{9}{100}$$

$$\text{(or) } v = \frac{100}{9} = 11.11 \text{ cm}$$

Thus, the image is at 11.11 cm behind the convex mirror.

(ii) Determination of size.

$$\text{Using, } m = \frac{h'}{h} = -\frac{v}{u} \text{ (or) } h' = -\frac{v}{u}h$$

$$\text{(or) } h' = \frac{(100/9)(4)}{-25} = -\frac{16}{9} = -1.78 \text{ cm}$$

Thus, size of image = -1.78 cm.

(iii) Since h' is negative, so the image is inverted.