

PHYSICS - X-PART-4 CLASS 36



4 Reflection of Light

1. When an object is placed in front of a concave mirror at a distance 30 cm from an image is obtained on a screen at a distance of 20 cm from the mirror. Find the focal length of the mirror.

The distance of the object from the mirror $u = -30$ cm

The distance to the image from the mirror $v = -20$ cm

The focal length of the mirror $f = ?$

$$\begin{aligned} f &= uv/(u+v) \\ &= (-30 \times -20) / (-30 -20) \\ &= (600) / (-50) \\ f &= -12 \text{ cm} \end{aligned}$$

2. An object is placed in front of a concave mirror 20 cm away from it. If its focal length is 40 cm, locate the position of image and its nature

The distance of the object from the mirror $u = -20$ cm

The distance to the image from the mirror $v = ?$

The focal length of the mirror $f = -40$ cm

$$\begin{aligned} v &= uf/(u-f) \\ &= (-20 \times -40) / (-20 +40) \\ &= (800) / (20) \\ v &= 40 \text{ cm} \end{aligned}$$

Nature of the image
erect and virtual

3. When an object is placed in front of a concave mirror at a distance 15 cm an image is formed on a screen 10 cm away from the mirror. If the object is placed 30 cm away what is the distance to the image?

The distance of the object from the mirror $u = -15$ cm

The distance to the image from the mirror $v = -10$ cm

The focal length of the mirror $f = ?$

$$\begin{aligned}f &= uv/(u+v) \\ &= (-15 \times -10) / (-15 -10) \\ &= (150) / (-25) \\ f &= -6 \text{ cm}\end{aligned}$$

The distance of the object from the mirror $u = -30$ cm

The distance to the image from the mirror $v = ?$

The focal length of the mirror $f = -6$ cm

$$\begin{aligned}v &= uf/(u-f) \\ &= (-30 \times -6) / (-30 +6) \\ &= (180) / (-24) \\ v &= -7.5 \text{ cm}\end{aligned}$$

Nature of the image

real and inverted

Worksheet

1. An object is placed in front of a concave mirror 40 cm away from it. If its focal length is 80 cm, locate the position of image and its nature