

Chapter 04

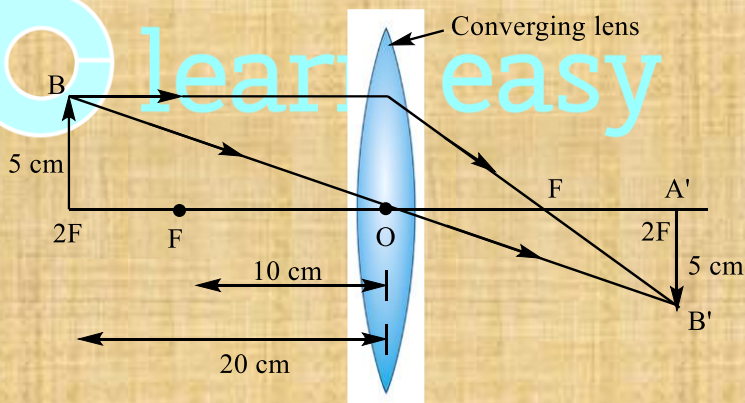
REFRACTION OF LIGHT AT CURVED SURFACES

Example

An object of 5 cm is placed 20 cm move from a converging lens of focal length 10 cm. Draw the ray diagram to produce the image and find the position, size of the nature of the image formed.

Solution:

In this case, $f = +10 \text{ cm}$, $u = -20 \text{ cm}$, $h_1 = 5 \text{ cm}$. Here, object is placed 20 cm away from the lens of focal length 10 cm, so object is at $2F$. So the image of the object will be formed at $2F$ on right side of the lens. The image formed will be real, inverted and of the same size as that of the object as shown in the diagram.



$$h_1 = 5 \text{ cm}, u = -20 \text{ cm}, f = 10 \text{ cm}$$

Step -1: Using $-\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$, we have

$$= -\frac{1}{(-20)} + \frac{1}{v} = \frac{1}{10} \quad (\text{or}) \quad \frac{1}{v} = \frac{1}{10} - \frac{1}{20} = \frac{1}{20}$$

$$\therefore v = +20 \text{ cm}.$$

Positive sign shows that a real image is formed.

Step-2: Using, $\frac{h_2}{h_1} = \frac{v}{u}$, we have $h_2 = \frac{v}{u} h_1$

$$= \frac{20}{-20} \times 5 = -5 \text{ cm}$$

Negative sign shows that the image formed is inverted.

Thus, image formed is real, inverted and of the same size as that of the object.

