

Class X

EXPERIMENT No: 8

Aim:- To find the image distance for varying object distances in case of a convex lens and draw corresponding ray diagrams to show the nature of image formed.

Material and Apparatus required:- Convex lens preferably of focal length 15 cm, candle with stand, lens holder, a screen with stand, matchbox, meter scale.

Principle:- The nature and position of the image form by convex lens depends upon the position of the object with respect to convex lens. The image may be real or virtual. For real image, the object should be placed on the focus or beyond the focus and for virtual image, object should be between optical centre O and focus F.

Position of the object	Position of the image	Size and nature of the image	Ray-diagram
An infinity	at focus F_2	Highly diminished, real and inverted	
Beyond $2F_1$	between F_2 and $2F_2$	Diminished, real and inverted	
At $2F_1$	at $2F_2$	Same size real and inverted	

Procedure:-

1. Obtain an approximate value of the focal length of the convex lens by focusing the image of a distant object.
2. Fix a meter scale on the table with a cello tape.
3. Fix lens in a lens holder and place it in the middle the meter scale, such that its principal axis is parallel to the meter scale.
4. Mount a candle vertically on a candle stand, light it with a matchbox and place it on the left hand side of the lens. Adjust the height of the candle or the lens such that the tip of the lighted candle lies on the principle axis of the lens.

- Place a vertically mounted card board pasted with graph paper (Screen) on the right side of the lens. Adjust its height such that the entire image can be taken on the screen.
- Make adjustment to get a sharp image of lighted candle on the screen, by keeping the lighted candle at (1) far away from lens (at infinity) (2) beyond 2F (3) at 2F (4) bet 2F and F. Take at least three observations.
- When a burning candle is kept at focus, It is not possible to obtain a sharp image at any position of the cardboard.

Observations :-

Rough focal length of the lens =cm

S. No.	Position of lens (cm)	Position of candle (cm) the screen (cm)	Position of the image on Nature of image

Result:-

- As the object moves towards the focus of the lens the size of the image increases and it moves away from the focus.
- When object is brought too close to the lens, the image on the other side is not seen.

Precautions:-

- Perform the experiment at a shaded place.
- For obtaining the rough focal length of the lens any distant object can be considered either a tree or sun. If focusing the sun, then not look the image directly, it may hurt the eyes.
- The aperture of the lens should be small.