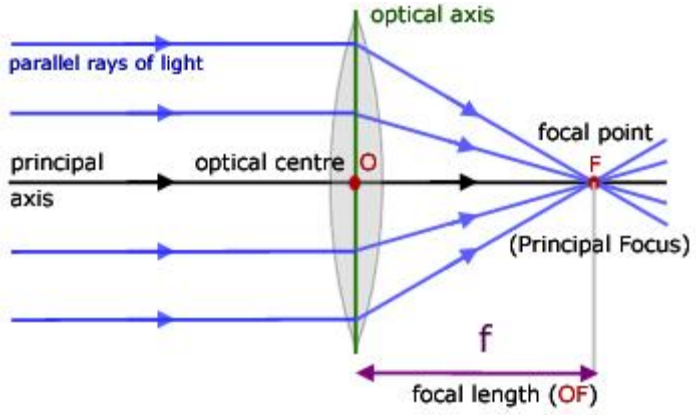
LINEAR MAGNIFICATION

Learning objectives

1. Express the relationship between the object distance, the image distance, and the focal length in a form of equation
2. Formulate five basic rules of ray tracing
3. Drawing a ray diagram to show how magnifying glasses work

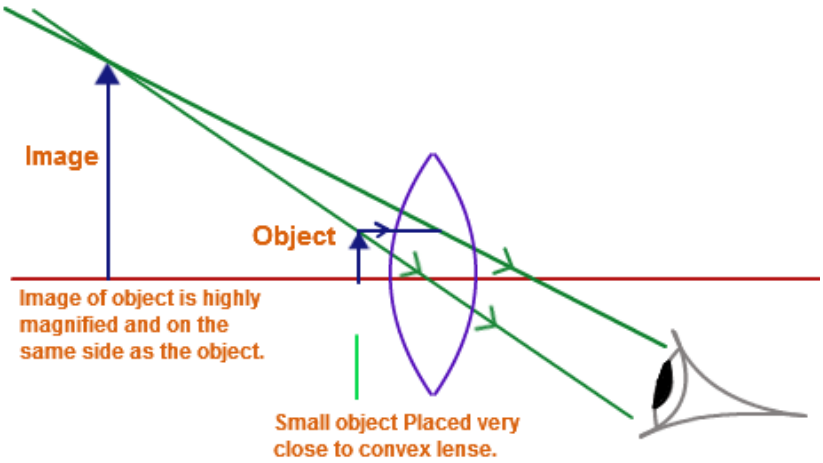
Refresh memory: principal axes, focal point F, principal focus, focal length f , converging lenses, diverging lenses, real image, virtual image.

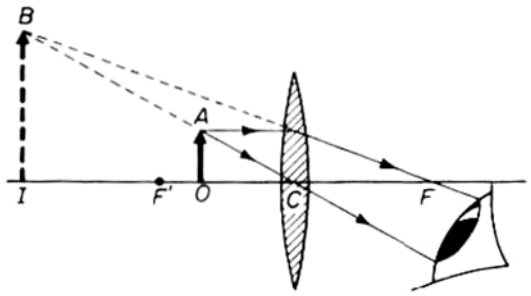
Convex or converging lens is so-called because it makes parallel rays of light converge.



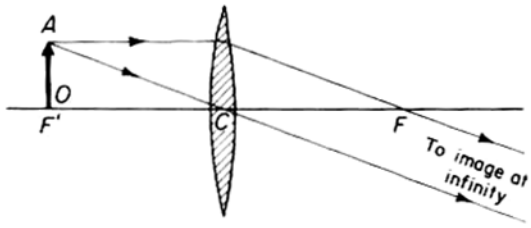
Principal focus- point where the rays are concentrated together, and where a piece of paper needs to be placed if it is to be burned.

Focal length - distance from the centre of the lens to the principal focus. The fatter the lens, the closer the principal focus is to the lens. A magnifying glass is a converging lens. The object viewed through it is closer to the lens than the principal focus.

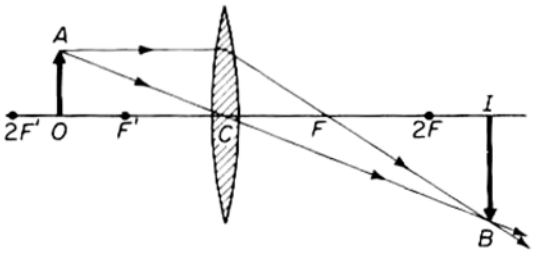




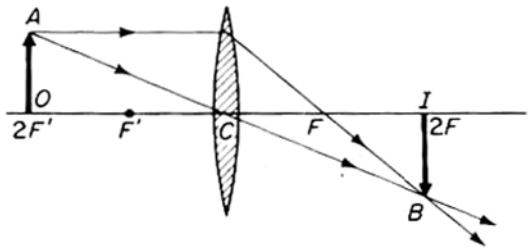
OBJECT BETWEEN LENS and F'
the image is,
(1) Behind the object
(2) Virtual
(3) Erect
(4) Larger than object



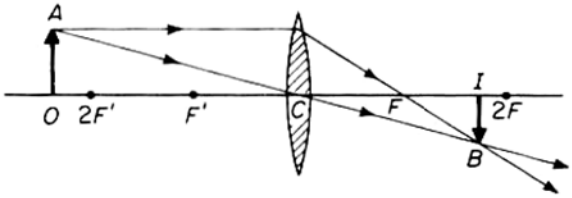
OBJECT AT F'
the image is at infinity



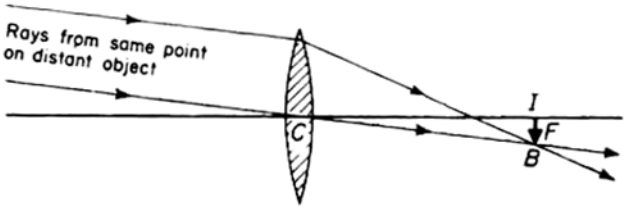
OBJECT BETWEEN F' and 2F'
the image is,
(1) Beyond 2F
(2) Real
(3) Inverted
(4) Larger than object



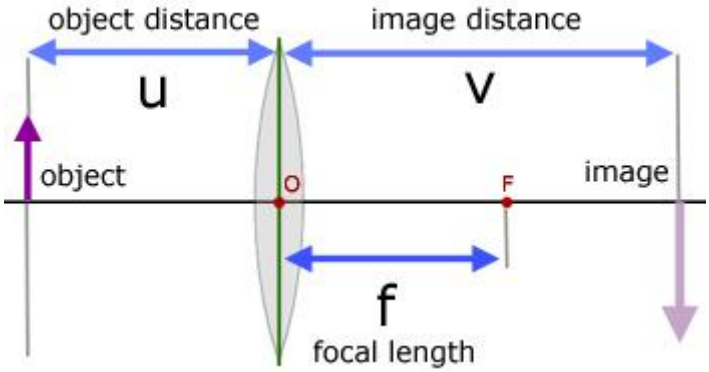
OBJECT AT 2F'
the image is,
(1) At 2F
(2) Real
(3) Inverted
(4) Same size as object

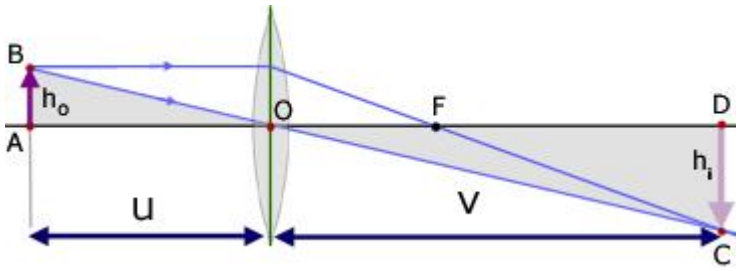


OBJECT BEYOND 2F'
the image is,
(1) Between F and 2F
(2) Real
(3) Inverted
(4) Smaller than object



OBJECT AT INFINITY
the image is,
(1) At F
(2) Real
(3) Inverted
(4) Smaller than object





$$\text{linear magnification} = h_i/h_o = v/u$$

Questions from page 155

FIVE BASIC RULES OF RAY TRACING

- A ray entering a converging lens parallel to its axis passes through the focal point F of the lens on the other side.
- A ray entering a diverging lens parallel to its axis seems to come from the focal point F.
- A ray passing through the center of either a converging or a diverging lens does not change direction.
- A ray entering a converging lens through its focal point exits parallel to its axis.
- A ray that enters a diverging lens by heading toward the focal point on the opposite side exits parallel to the axis.