

Lens formula

$$\frac{1}{p} + \frac{1}{i} = \frac{1}{f} = (n - 1) \left(\frac{1}{r_1} - \frac{1}{r_2} \right)$$

Sign of r_1 and r_2 : Convex relative to object is +
Concave relative to object is -

$i \rightarrow +$ if on opposite side of lens as object (real)

$i \rightarrow -$ if on same side of lens as object (virtual)

$f \rightarrow +$ if converging (image could be real or virtual)

$f \rightarrow -$ if diverging (image always virtual)

$$m = -\frac{i}{p} = \frac{h_i}{h_o}$$

Mirror formula

$$\frac{1}{p} + \frac{1}{i} = \frac{1}{f} = \frac{2}{r}$$

$i \rightarrow +$ if on same side of mirror as object (real)

$i \rightarrow -$ if on opposite side of mirror as object (virtual)

$f \rightarrow +$ if converging (image could be real or virtual)

$f \rightarrow -$ if diverging (image always virtual)

$$m = -\frac{i}{p} = \frac{h_i}{h_o}$$

- 1. An object 4.0 cm tall is placed in front of a converging lens of focal length 22 cm. Where is the image formed, and what are its characteristics, if the object distance is (a) 15 cm ? (b) 36 cm?**
- 2. A concave mirror has a magnification of +3.0 for an object placed 50 cm in front of it. (a) What type of image is formed? (b) Find the radius of curvature of the mirror.**