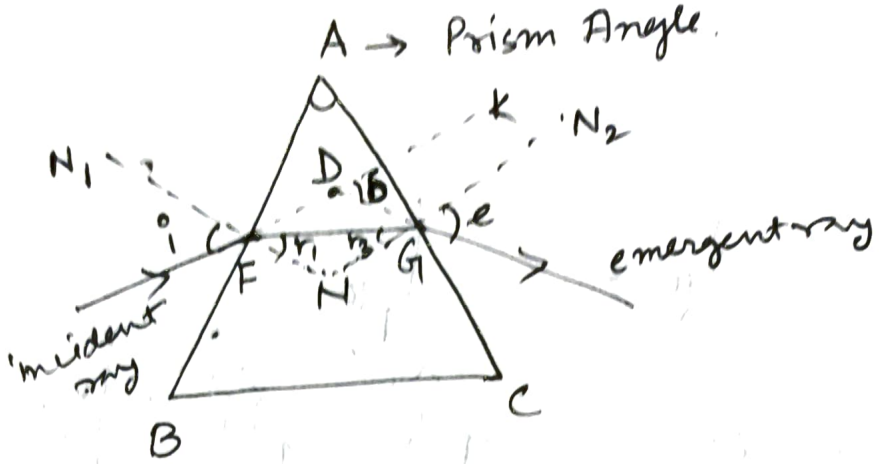
Refraction through a Prism



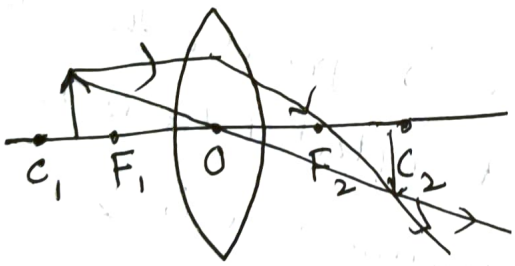
i → Angle of incidence

e → emergent angle

δ → angle of deviation

Lens

① Convex lens or Converging lens

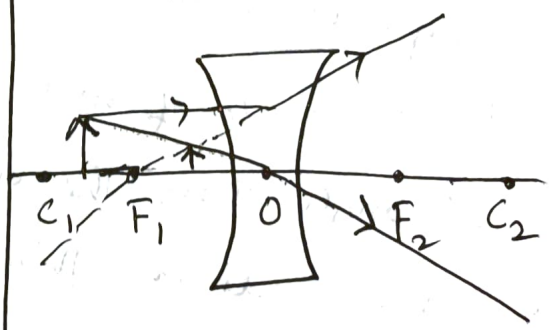


O → optical centre

C_1OC_2 → Principal axis

OC_1, OC_2 } Radius of curvature

② Concave lens or Diverging lens



OF_1, OF_2 } Focal lengths

F → Focus.

C → Centre of curvature.

Lens formula

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

$v \rightarrow$ image distance.
$u \rightarrow$ object distance.
$f \rightarrow$ focal length.

Magnification, m

$$m = \frac{h'}{h} \text{ or } \frac{v}{u}$$

$h' \rightarrow$ size of the image
$h \rightarrow$ size of the object.

Sign Convention

① All distances are measured from the optical centre.

② Distance measured along the direction of incident light is taken as positive and in opposite direction is taken as negative.

③ Distance measured upward and perpendicular to the principal axis are taken as positive and in downward direction is taken as negative

Power of a Lens

It is defined as the reciprocal of its focal length in 'm' and the unit of power is Dioptre 'D'.

$$\text{Thus } P = \frac{1}{f(\text{in m})} \text{ dioptre (D)}$$

(1) Refractive index of glass is 1·5. What is the velocity of light in glass ?

Soln :- WKT,

Refractive index, $\mu = \frac{c}{v}$

Given $\mu = 1{\cdot}5$

$$\therefore 1{\cdot}5 = \frac{c}{v}$$

$$\Rightarrow v = \frac{c}{1{\cdot}5}$$

$$= \frac{3 \times 10^8 \text{ ms}^{-1}}{1{\cdot}5}$$

$$= 2 \times 10^8 \text{ ms}^{-1}$$

(2) A spherical lens has a power of −0·25 D. find the focal length of the lens ?

$\Rightarrow$ Given Power $P = -0{\cdot}25$ D

WKT

$$P = \frac{1}{f}$$

$$\Rightarrow f = \frac{1}{P}$$

$$= \frac{1}{-0{\cdot}25}$$

$$= -\frac{100}{25}$$

focal length, $f = -4$ m