

Chapter 10

REFLECTION AND REFRACTION

Power of the Lens:

The focal power(P) of a lens is numerically equal to the reciprocal of its focal length in metres.

a) When 'f' is measured in metres then $\left[P = \frac{1}{f} \right]$ dioptre.

b) When 'f' is measured in centimetres. $\left[P = \frac{100}{f} \right]$ dioptre.

S.I unit of focal power is dioptre(D).

Power of a convex lens is

positive and for concave lens is negative.

If two lenses are separated by a distance 'd' then the effective focal length of the combination is given by

$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} - \frac{d}{f_1 f_2}.$$

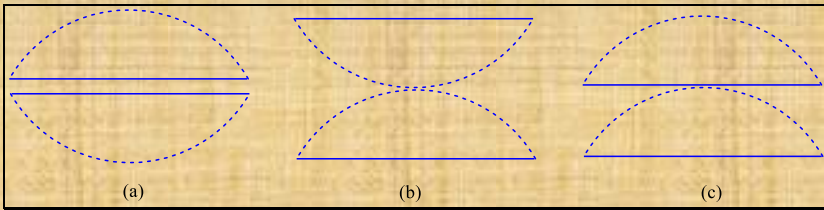
(Proper sign must be given to f_1 and f_2)

If two lenses of focal powers P_1 and P_2 are separated by distance 'd' then effective focal length power of a combination is given by (Proper sign must be given to P_1, P_2)

$$[P = P_1 + P_2 - dP_1P_2]$$

If two convex lenses of focal lengths, f_1, f_2 are separated by distance 'd' such that the combination will act as parallel sided glass slab. Then $[d = f_1 + f_2]$.

An equi:- Convex lens of focal length 'f' is cut into two equal plano-convex lenses. When they are arranged as shown; their equivalent focal length is unchanged.



(Treat lenses in contact in these figures)

Focal length of each small lens becomes $2f$.

$$\therefore \frac{1}{F} = \frac{1}{2f} + \frac{1}{2f} = \frac{1}{f}$$

$$\therefore F = f.$$

