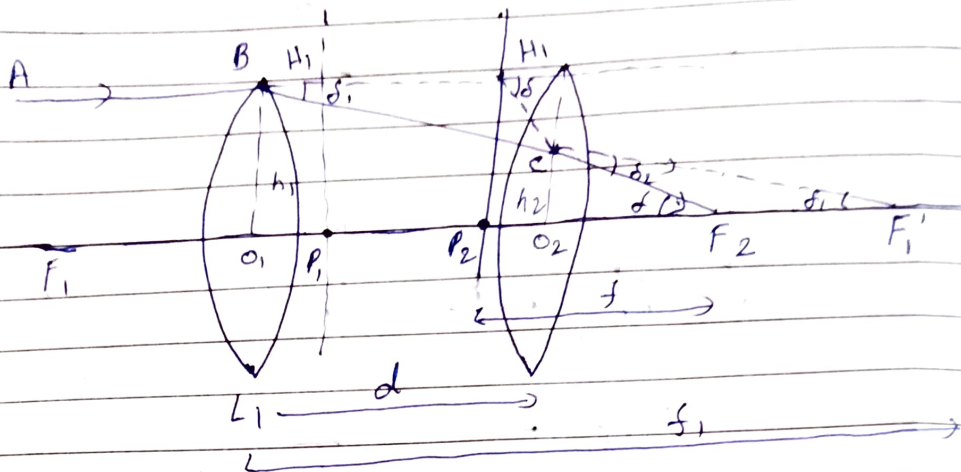


cardinal points of a combination of two thin lenses separated by a finite distance



Equivalent focal length of lens combination

$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} = \frac{d}{f_1 f_2} \quad \text{--- (i)}$$

From fig.

$$\tan \delta_1 = \frac{h_1}{f_1} \quad \text{--- (ii)}$$

$$\tan \delta = \frac{h_1}{f} \quad \text{--- (iii)}$$

calculation of principal point P2

$$O_2 P_2 = D H_2$$

$$\tan \delta = \frac{C D}{D H_2}$$

$$D H_2 = \frac{C D}{\tan \delta} \quad \text{--- (iv)}$$

$$O_2P_2 = DH_2 = \frac{CD}{\tan \delta}$$

$$\tan \delta_1 = \frac{CD}{BD}$$

$$\tan \delta_1 = \frac{CD}{d}$$

$$CD = d \tan \delta_1$$

$$O_2P_2 = \frac{d \tan \delta_1}{\tan \delta}$$

$$O_2P_2 = d \times \frac{h_1}{f_1} \times \frac{f}{h_2}$$

$$O_2P_2 = \frac{df}{f_1}$$

$$\alpha_2 = -\frac{df}{f_1}$$