(3) By using a crossed lens. →

It can be proved mathematically that spherical abberation is minimum when ratio of radius of curvature of lens will are

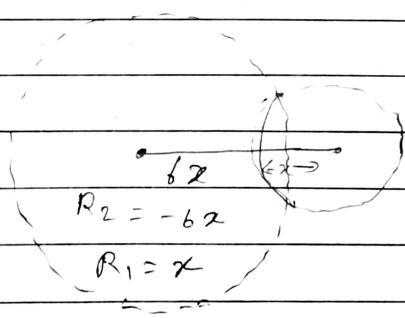
$$\frac{R_1}{R_2} = \frac{2\mu^2 - \mu - 4}{\mu(2\mu + 1)}$$

Generaly Refractive endex of lens $\mu = 1.5$

$$\frac{R_1}{R_2} = \frac{\mu(2\mu - 1) - 4}{\mu(2\mu + 1)}$$

$$\frac{R_1}{R_2} = \frac{1.5(3-1) - 4}{1.5(3+1)}$$

$$\frac{R_1}{R_2} = -\frac{1}{6}$$



$$\frac{R_1}{R_2} = \frac{x}{-6x} = -\frac{1}{6}$$

A lens whose $\left(\frac{R_1}{R_2} = -\frac{1}{6}\right)$

is called a cross lens.

Longitudinal spherecal abberation produced by a thin lens.

for a parallel beam is given by x (ASA)

$$x = \frac{\rho}{f_2}\left[\frac{K^2\mu^2 + K(\mu + 2\mu^2 + 2\mu^3) + \mu^3 - 2\mu^2 - 2}{2\mu(\mu-1)^2\,(1-K)^2}\right]$$

$$K = \frac{R_1}{R_2}$$

$\rho \Rightarrow$ Radius of lens aperture

$$\frac{dx}{dK} = 0$$

$$K = \frac{R_1}{R_2} = \frac{2\mu^2 - \mu - 4}{\mu(2\mu+1)}$$