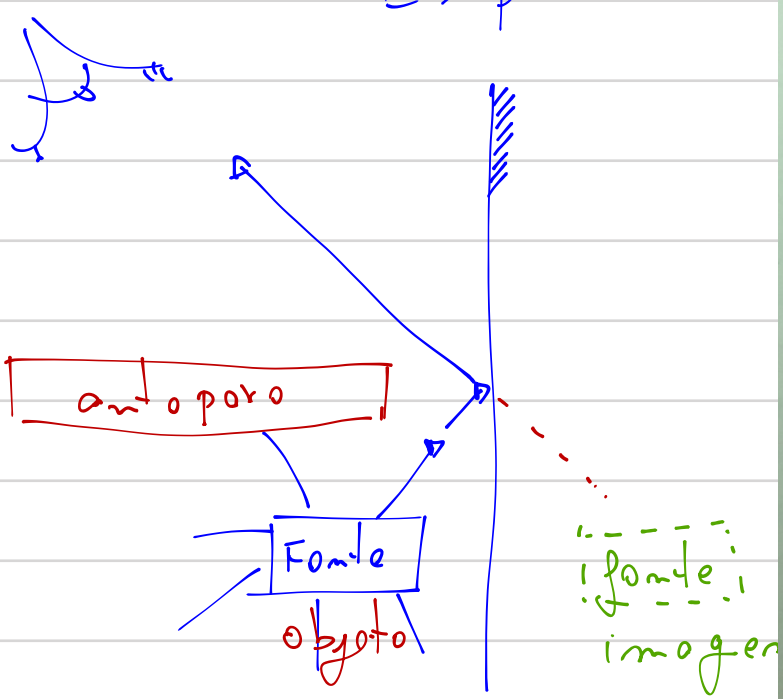
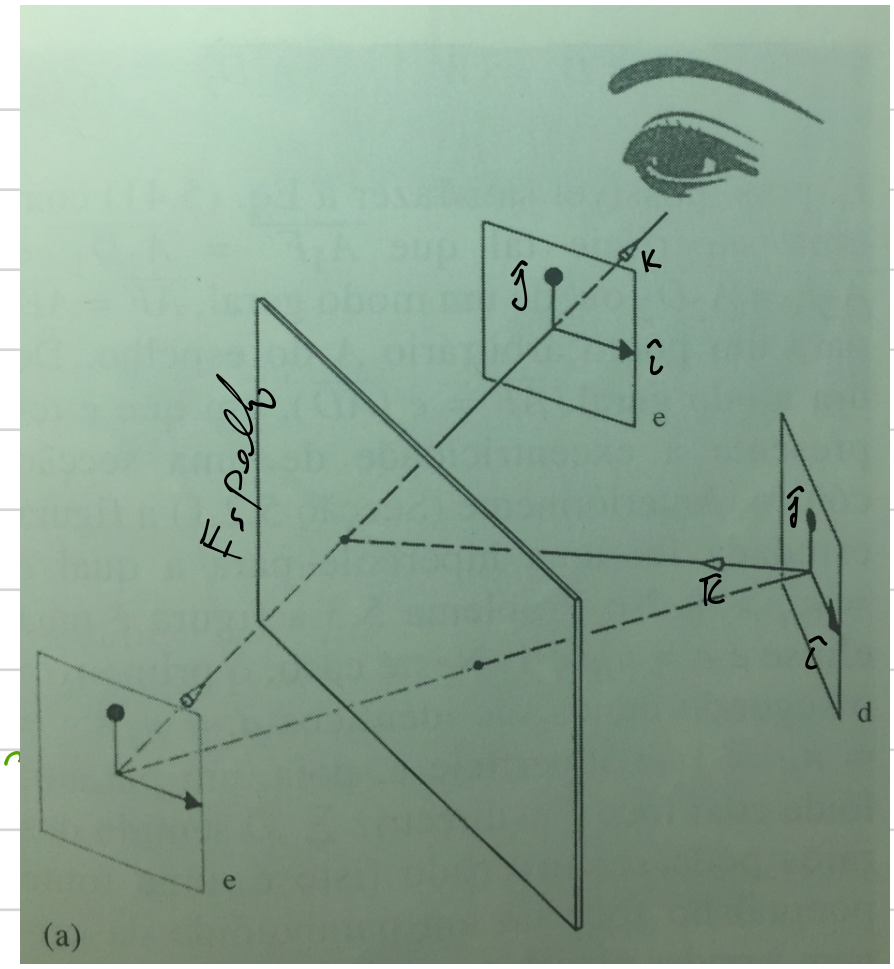
Espelhos





Lente

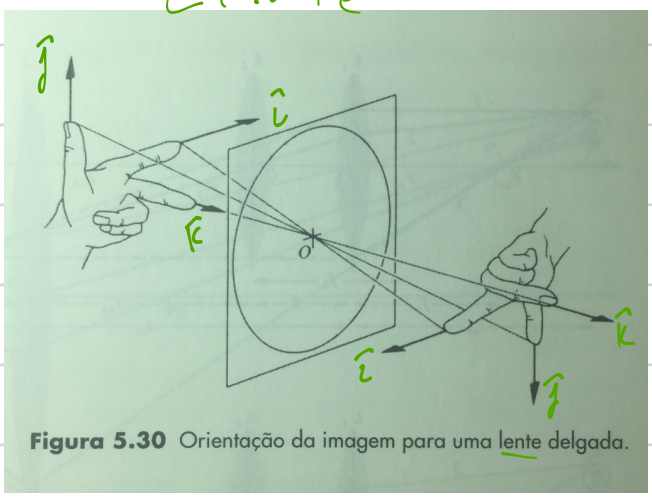
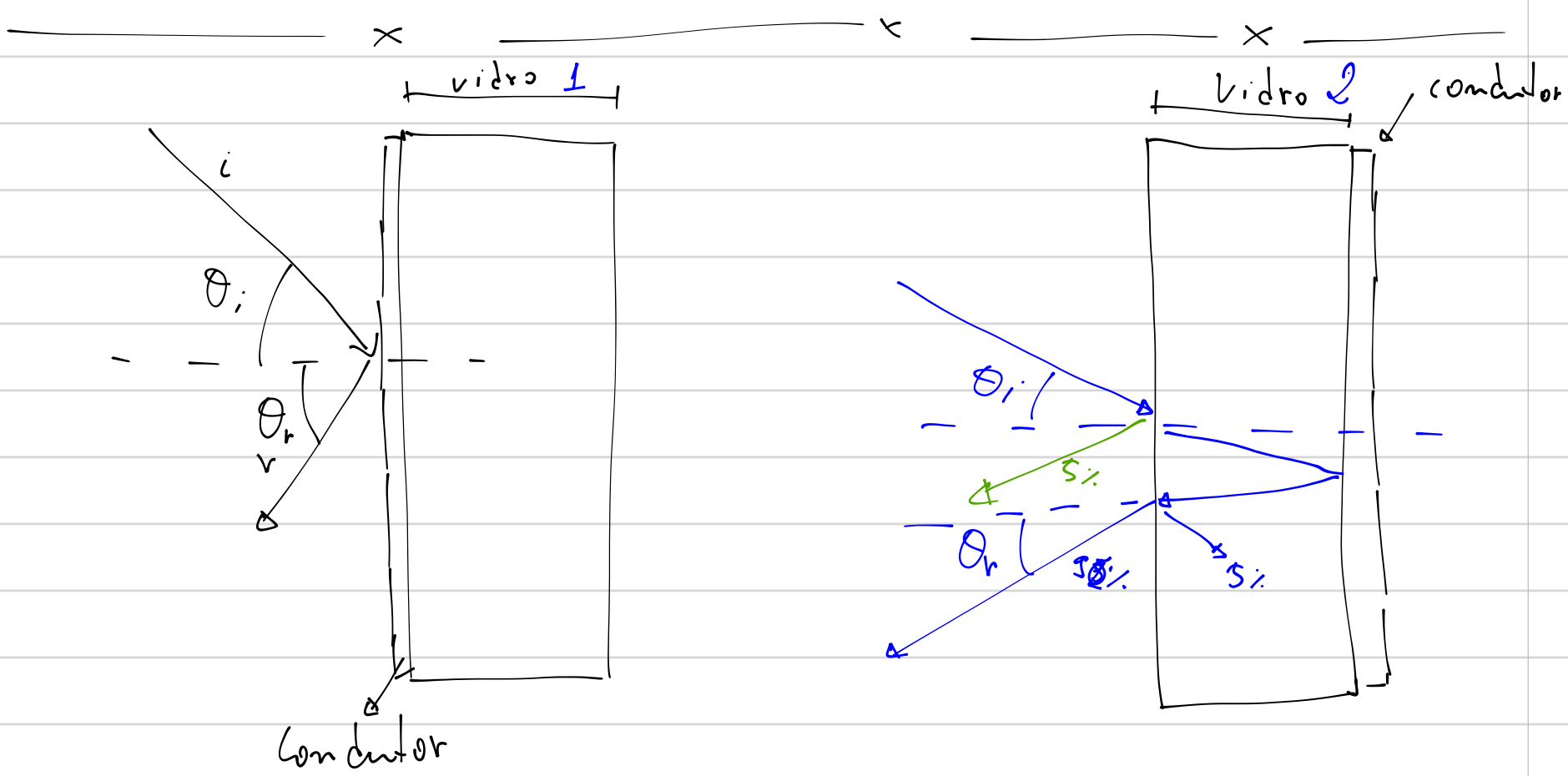
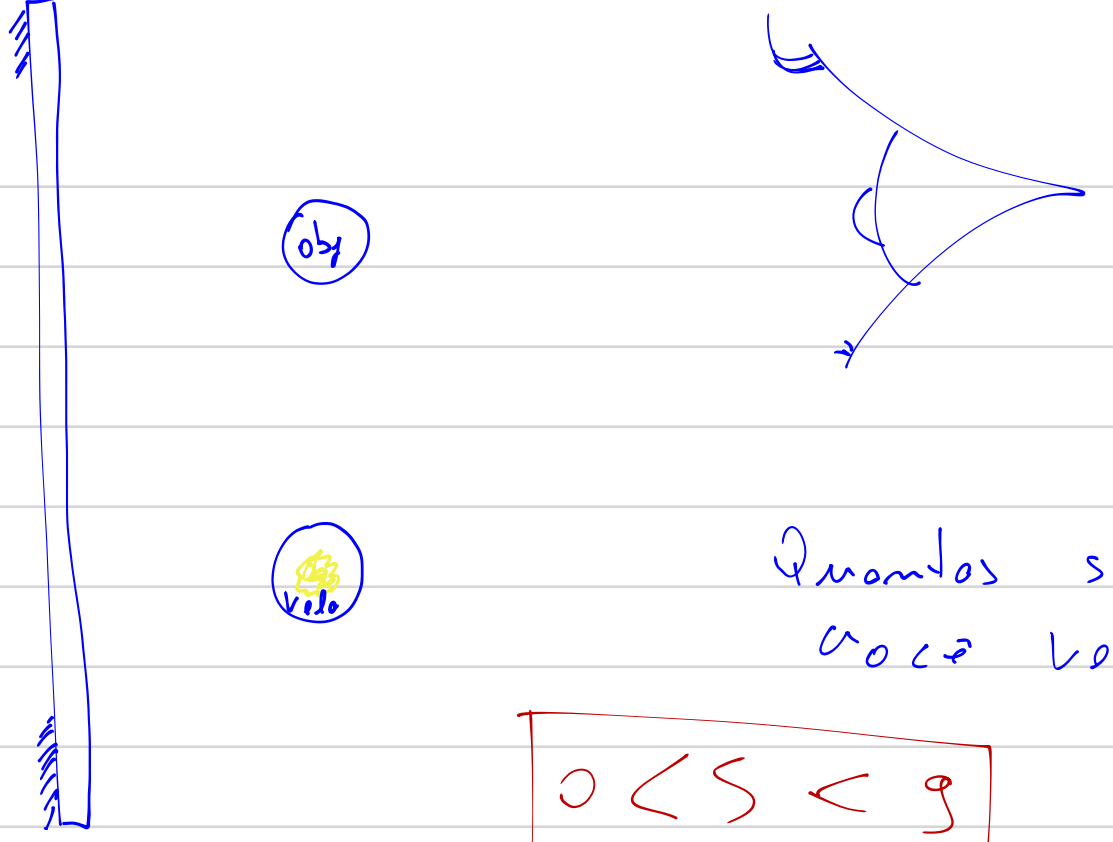


Figura 5.30 Orientação da imagem para uma lente delgada.



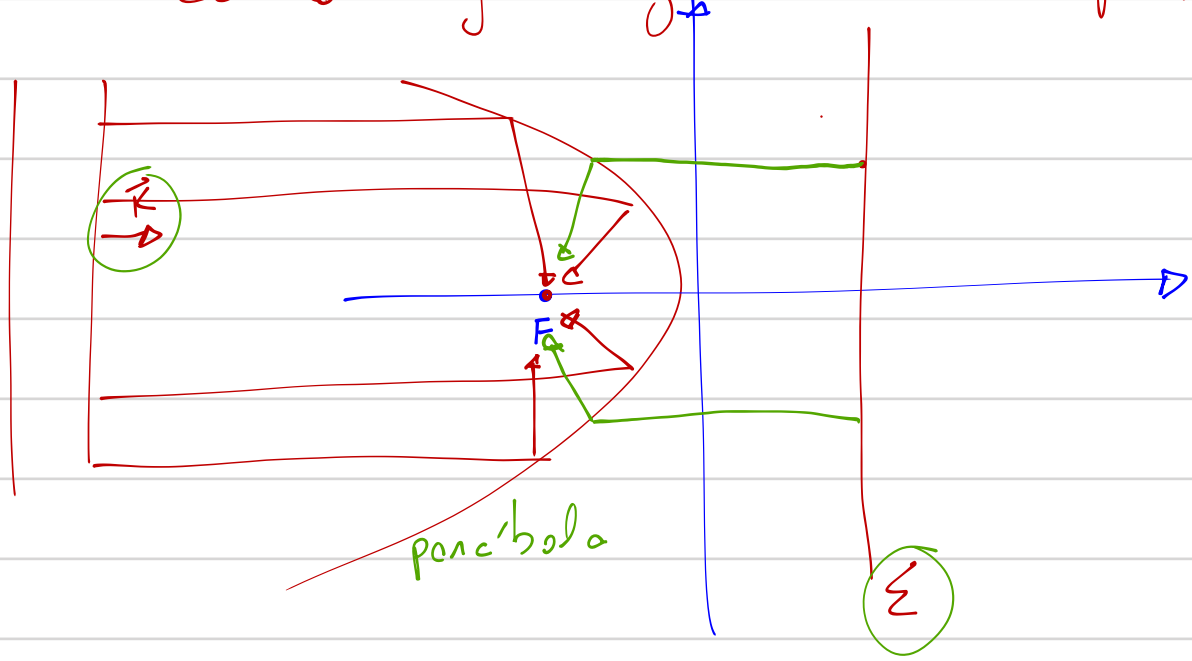
Visão Superior



Quantos sombras você verá?

$$0 < S < 9$$

Como focalizar ondas planas num ponto



Comparar esférico com parabólico

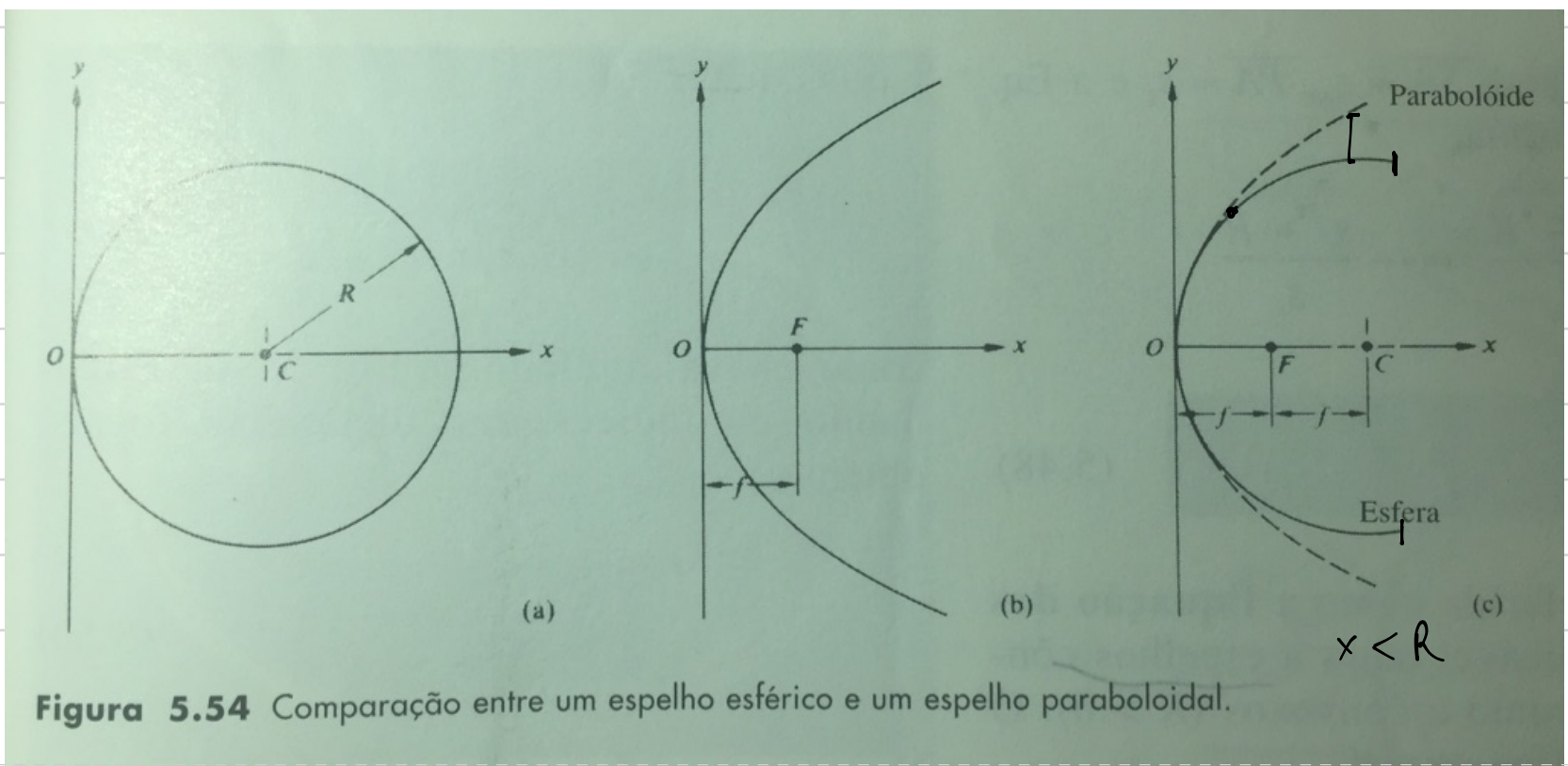
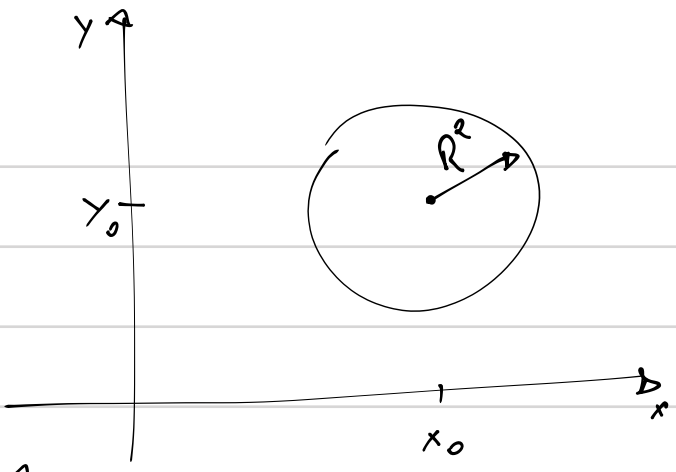


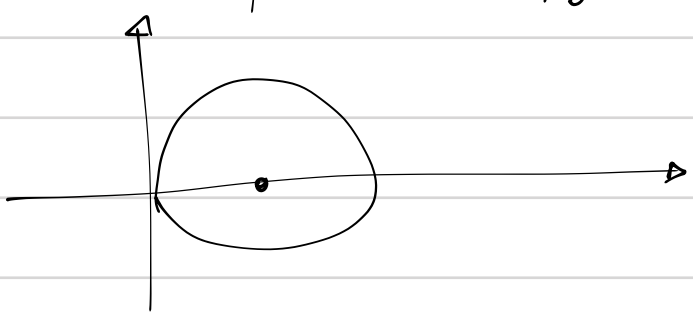
Figura 5.54 Comparação entre um espelho esférico e um espelho paraboloidal.



$$(x-x_0)^2 + (y-y_0)^2 = R^2$$

p/ fig 5.5 $y_0 = 0$

$x_0 = R$



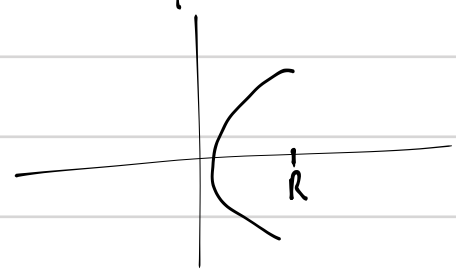
$$(x-R)^2 + y^2 = R^2$$

$$x^2 - 2xR + R^2 + y^2 = R^2$$

$$\boxed{x^2 - (2R)x + y^2 = 0}$$

$$x = \frac{2R \pm \sqrt{4R^2 - 4y^2}}{2} = \boxed{R \pm \sqrt{R^2 - y^2}}$$

que solução p/ $x < R$



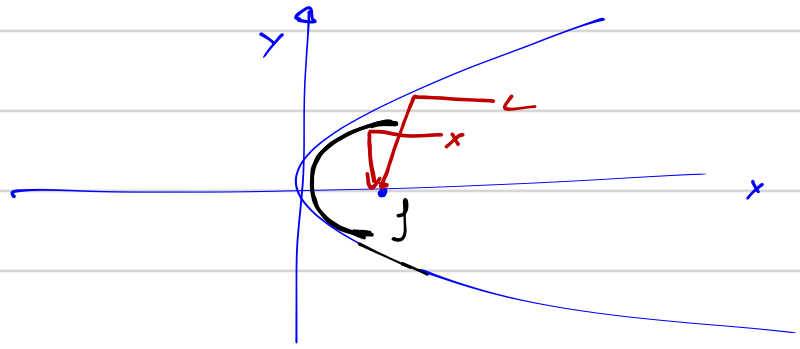
$$x = R - \sqrt{R^2 - y^2}$$

Série binomial $\boxed{(1+x)^K} = 1 + Kx + \frac{K(K-1)}{2!}x^2$

$$\boxed{X = \frac{y^2}{2R} + \frac{1}{8}\frac{y^4}{R^3} + \frac{y^6}{16R^5}}$$

representa um semi-círculo

$y^2 = 4fx$



parábola

$$X = \boxed{\text{parábola}} + \frac{1}{8}\frac{y^4}{R^3} + \frac{y^6}{16 \cdot R^5} + \cdots$$

$$\frac{y^2}{2 \cdot (2f)}$$

diferença entre o semi círculo e a parábola (ideal)

Equações dos espelhos

! Cuidado com a convenção dos sinais

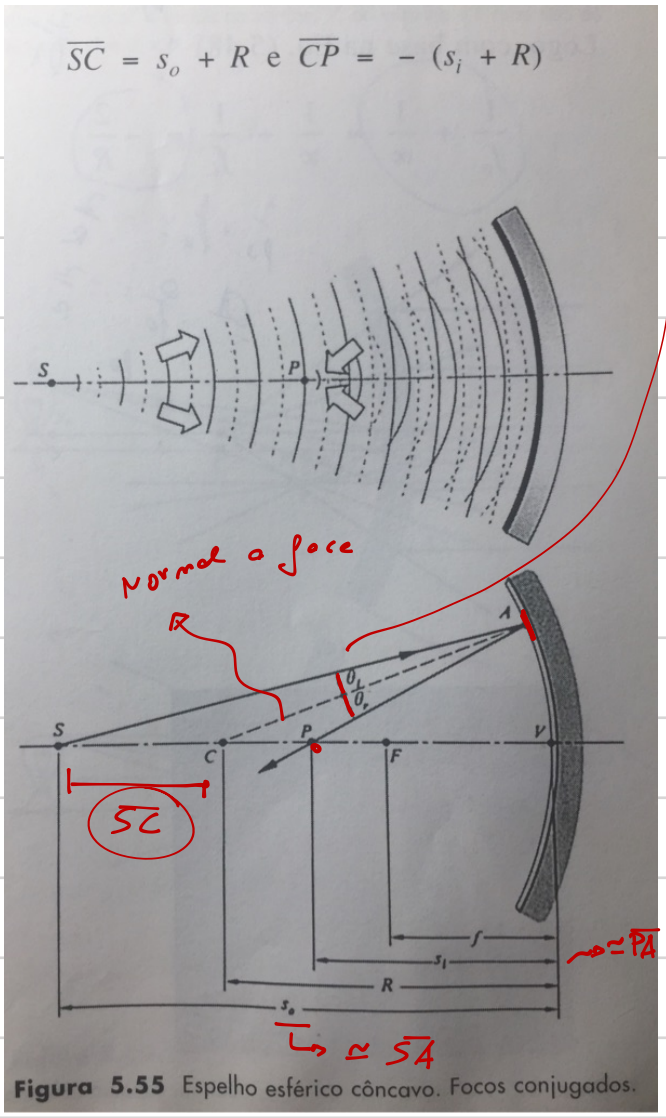


Figura 5.55 Espelho esférico côncavo. Focos conjugados.

$$\frac{\overline{SC}}{\overline{SA}} = \frac{\overline{CP}}{\overline{PA}}$$

$\overline{SC} = s_o - |R|$

$\overline{CP} = |R| - s_i$

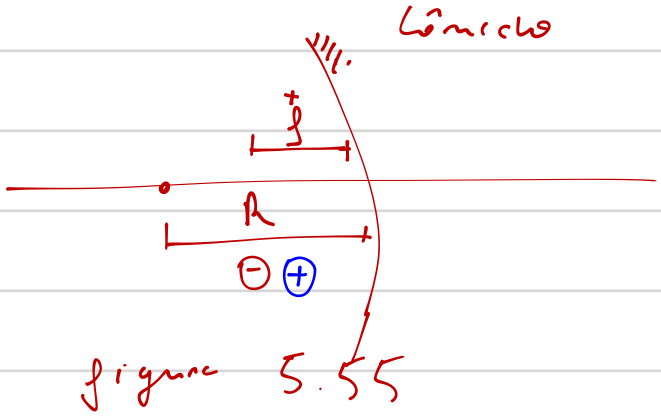
---

aproximamos p raios paraxiais

$\overline{SA} \simeq s_o \qquad \overline{PA} \simeq s_i$

$$\boxed{\frac{s_o - |R|}{s_o} = \frac{|R| - s_i}{s_i}}$$

Côncavo



Convexa

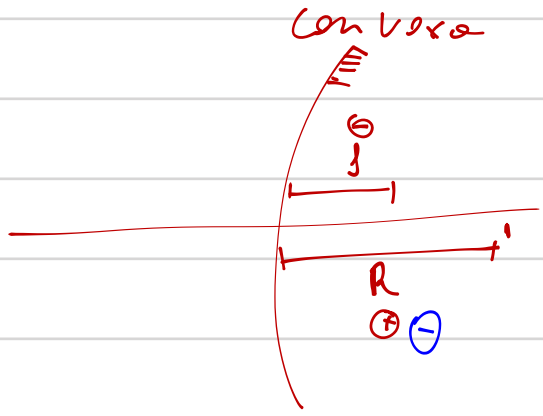


figura 5.55

$$\frac{s_o \mp R}{s_o} = -\frac{(s_i \mp R)}{s_i}$$

$$1 \mp \frac{R}{s_o} = -1 \pm \frac{R}{s_i}$$

$$R\left(\frac{-1}{s_o} + \frac{-1}{s_i}\right) = -2$$

$$\boxed{\left(\frac{1}{s_o} + \frac{1}{s_i}\right) = \frac{-2}{R}} \quad \text{Hecht}$$

$$\boxed{\frac{1}{s_o} + \frac{1}{s_i} = \frac{2}{R}} \quad \text{Holliday}$$
