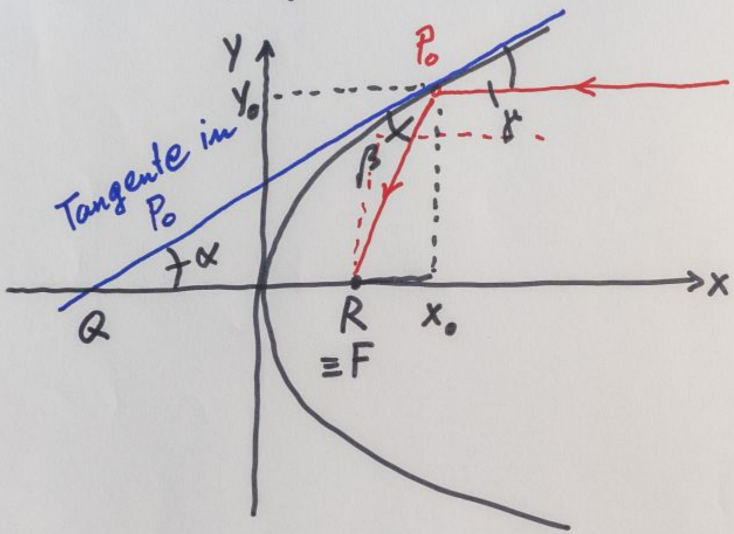
Kegelschnitte

Parabel

Brennpunkt-Eigenschaft

(Parabolspiegel, Scheinwerfer)



Reflexionsgesetz: $\beta = \gamma$

Stufenwinkel: $\alpha = \gamma$

$\Big\} \; \alpha = \beta$

$\rightarrow \; \Delta QRP_0$ gleichschenklig

$$|\overline{QR}| = |\overline{RP_0}|$$

Gleichung der Tangente in P_0

$$y^2 = 2px$$

$$y' \equiv \frac{dy}{dx} = \sqrt{2p}\,\frac{1}{2\sqrt{x}} = \sqrt{\frac{p}{2x}} \;\rightarrow\; m = y'\Big|_{P_0} = \sqrt{\frac{p}{2x_0}}$$

Zweipunktgleichung P_0, Q: $y_Q - y_0 = m(x_Q - x_0)$, $y_Q = 0$

$$-\sqrt{2px_0} = \sqrt{\frac{p}{2x_0}}\,(x_Q - x_0)$$

$$-2x_0 = x_Q - x_0$$

$$x_Q = -x_0$$

$$\rightarrow |\overline{QR}| = |x_Q| + x_R = x_0 + x_R$$

$$|\overline{RP_0}| = \sqrt{(x_0 - x_R)^2 + y_0^2} = \sqrt{(x_0 + x_R)^2 - 4x_0x_R + 2px_0}$$

$$= \sqrt{(x_0 + x_R)^2 + 2x_0(p - 2x_R)} \overset{!}{=} x_0 + x_R$$

$$\rightarrow p = 2x_R, \quad x_R = \frac{p}{2} = e$$

$R \equiv F$ unabhängig von P_0