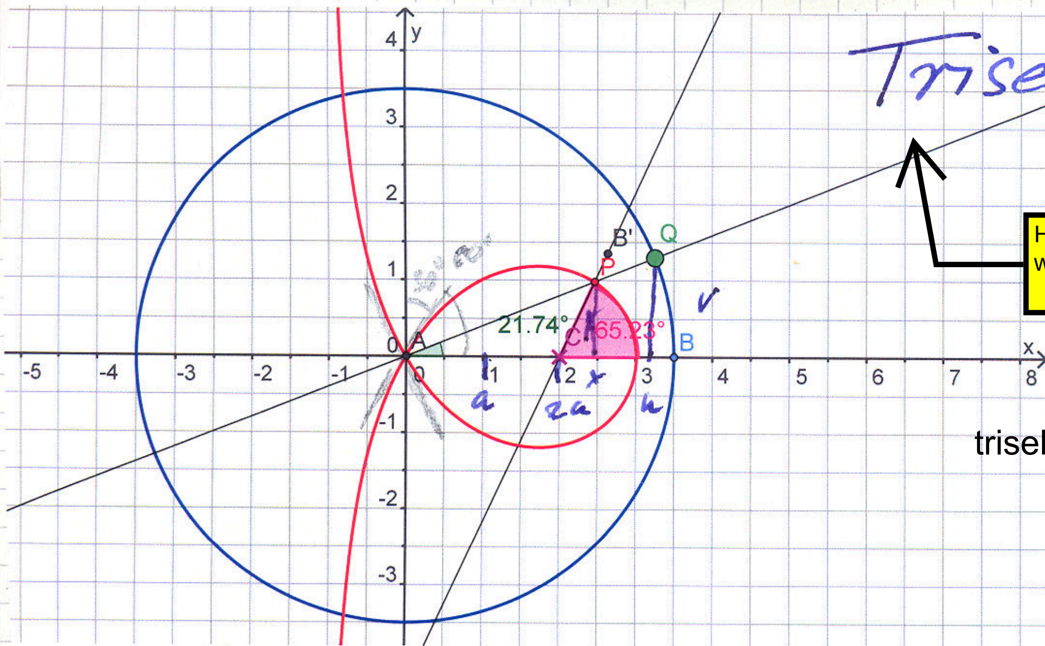
Trisektrix.

Haftendorn,
www.mathematik-verstehen.de

trisektrix-herleitung.pdf



$$\frac{y}{x-2a} = \tan 3\varphi$$

$u^2+v^2=R^2$ unnötig

$$\frac{y}{x} = \tan\varphi$$

$\frac{v}{u} = \tan\varphi$ unnötig

nur "technisch" sinnvoll
R kann keinen Einfluss haben.

$$\tan 3\varphi = \frac{-3\tan\varphi + \tan^3\varphi}{3\tan^2\varphi - 1}$$

$$\frac{y}{x-2a} = \frac{-3\,\frac{y}{x} + \frac{y^3}{x^3}}{3\,\frac{y^2}{x^2} - 1}$$

$$\frac{\cancel{y}}{x-2a} = \frac{-3yx^2+y^3}{3y^2x-x^3} \qquad |:y \quad y\neq 0$$

$$3y^2x - x^3 = (x-2a)(-3x^2+y^2)$$

$$x(3y^2-x^2) = x(-3x^2+y^2) - 2a(-3x^2+y^2)$$

$$x(3y^2-x^2+3x^2-y^2) = 6ax^2-2ay^2$$

$$x(2y^2+2x^2) = 2a(3x^2-y^2) \quad |:2$$

$$\boxed{x(y^2+x^2) = a(3x^2-y^2)}$$

Sicherer Pkt (a/a)

$$a(a^2+a^2) = a(3a^2-a^2)$$

$$2a^3 = 2a^3$$

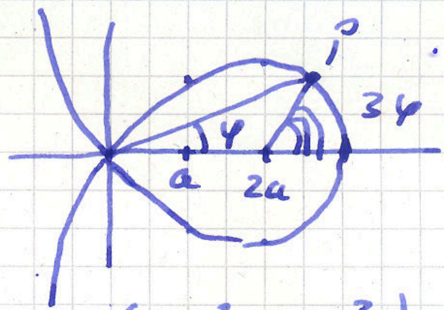
$\left(\frac{1}{2}\sqrt{3}s \,\middle|\, \frac{s}{2}\right) \wedge 2a = \frac{1}{2}\sqrt{3}s$

$$\frac{1}{2}\sqrt{3}s\left(\frac{s^2}{4}+\frac{3}{4}s^2\right) = a\left(\frac{3\cdot 3}{4}s^2 - \frac{s^2}{4}\right)$$

$$\frac{1}{2}\sqrt{3}\,s^3 = \frac{1}{4}\sqrt{3}s^3\cdot 2 \quad \text{passt}$$

passt
$(3a/0)$
$3a\cdot 9a^2 = a\cdot 3\cdot 9a^2$
passt.

Trisektix in der Lage



Gleichung $x(y^2+x^2) = a(3x^2-y^2)$

Polar $r\cos\varphi(r^2) = a(3r^2\cos^2\varphi - r^2\sin^2\varphi) \,|:r^2$

r=0 ist Lösg. $r\cos\varphi = a(3\cos^2\varphi - \sin^2\varphi)$

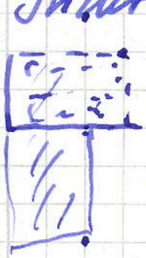
$$r = a\,\frac{3\cos^2\varphi - \sin^2\varphi}{\cos\varphi}$$

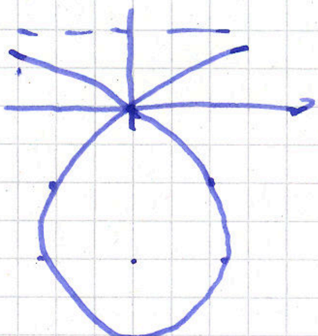
$1 - \cos^2\varphi = \sin^2\varphi$

$$r = a\,\frac{4\cos^2\varphi - 1}{\cos\varphi}$$

$$r = a\left(4\cos\varphi - \frac{1}{\cos\varphi}\right)$$

In der Lage





$-y(x^2+y^2) = a(3y^2-x^2)$

$y(x^2+y^2) = a(x^2-3y^2)$

$x \leftrightarrow y \leftrightarrow -y$

$x \longrightarrow -y$

$y \longrightarrow x$

In Klausur $x^2(a-y) = y^2(3a+y)$

$ax^2 - yx^2 = 3ay^2 + y^3$

$y^3 + yx^2 = ax^2 - 3ay^2$

$y(y^2+x^2) = a(x^2-3y^2)$ äquivalent.