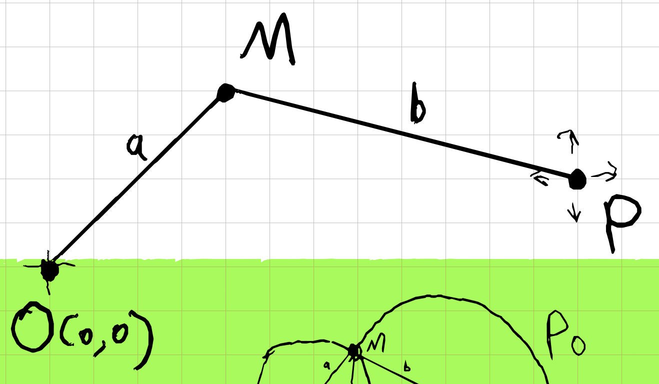
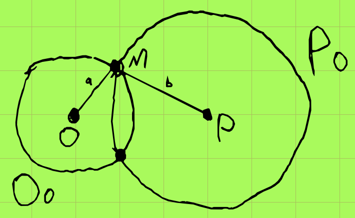




idk why this is marked

$$x^2 = a^2 - y^2 \Rightarrow x = \pm\sqrt{a^2-y^2}$$

$$O_0: \quad x^2+y^2=a^2 \qquad y=\sqrt{a^2-x^2}$$

$$P_0: \quad (P_x+x)^2+(P_y+y)^2=b^2$$

I might be stupid (P_x-x) instead

$$x^2+y^2+(P_x+x)^2+(P_y+y)^2 = a^2+b^2$$

$$x^2+y^2+P_x^2+2P_xx+x^2+P_y^2+2P_yy+y^2=a^2+b^2$$

$$2x^2+2P_xx+2y^2+2P_yy+P_x^2+P_y^2=a^2+b^2$$

$$2x^2+2P_xx+2y^2+2P_yy=a^2+b^2-P_x^2-P_y^2$$

$$x(x+P_x)+y(y+P_y) = \frac{a^2+b^2-P_x^2-P_y^2}{2}$$

$$a^2-y^2+\sqrt{a^2-y^2}\,P_x+y^2+yP_y = \frac{a^2+b^2-P_x^2-P_y^2}{2}$$

$$xP_x+yP_y = \frac{a^2+b^2-P_x^2-P_y^2}{2}-a^2$$

wrong ↑

$$2x^2-2P_xx+2y^2-2P_yy = a^2+b^2-P_x^2-P_y^2$$

$$x^2-P_xx+y^2-P_yy = \frac{a^2+b^2-P_x^2-P_y^2}{2}$$

$$a^2-y^2-P_x\sqrt{a^2-y^2}+y^2-P_yy = \frac{a^2+b^2-P_x^2-P_y^2}{2}$$

$$-P_x\sqrt{a^2-y^2}-P_yy = \frac{a^2+b^2-P_x^2-P_y^2}{2}-a^2$$

$$-P_x\sqrt{a^2-y^2}-P_y\sqrt{a^2-x^2} = \; \parallel$$

$$-P_xx-P_yy = \frac{a^2+b^2-P_x^2-P_y^2}{2}-a^2$$

$$-P_xx = \frac{a^2+b^2-P_x^2-P_y^2}{2}-a^2+P_yy$$

$$x = \frac{\frac{a^2+b^2-P_x^2-P_y^2}{2}-a^2+P_yy}{-P_x}$$

$$\sqrt{a^2-y^2} = \frac{\frac{a^2+b^2-P_x^2-P_y^2}{2}-a^2+P_yy}{-P_x}$$

$$(P_x-x)^2+(P_y-y)^2=b$$

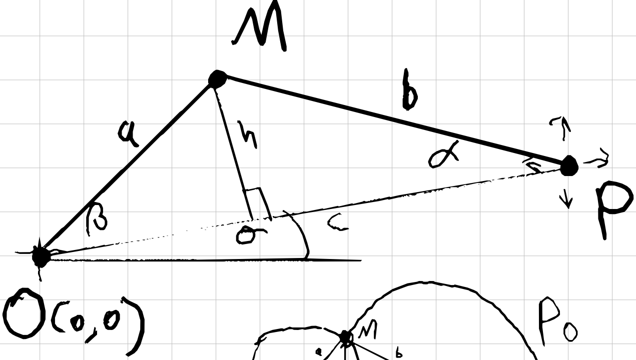
$$P_x-x=\sqrt{b-(P_y-y)^2}$$

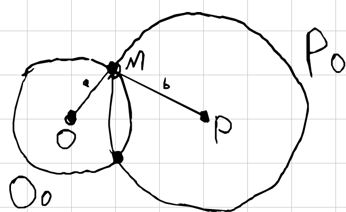
$$x=P_x-\sqrt{b-(P_y-y)^2}$$

$$P_x-\sqrt{b-(P_y-y)^2}=\sqrt{a^2-y^2}$$

$$P_x\sqrt{a^2-y^2}-\sqrt{(b-(P_y-y)^2)(a^2-y^2)} = a^2-y^2$$

Geometry Time





$$b^2 = a^2 + c^2 - 2ac\cos\beta$$

$$b^2 - a^2 - c^2 = -2ac\cos\beta$$

$$\frac{b^2 - a^2 - c^2}{-2ac} = \cos\beta$$

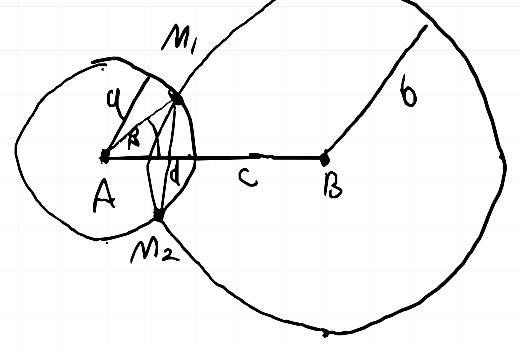
$$\cos^{-1}\left(\frac{b^2 - a^2 - c^2}{-2ac}\right) = \beta$$

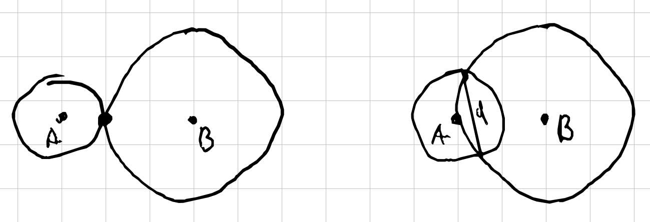
$$\sigma = \tan^{-1}\left(\frac{P_y}{P_x}\right)$$

$$M_x = a\cos(\beta + \sigma)$$

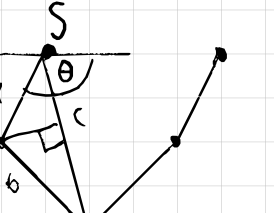
$$M_y = a\sin(\beta + \sigma)$$

This is a dumb way





$d = a+b \Rightarrow \beta = 0$



$p + q = c$

$p^2 + h^2 = a^2$

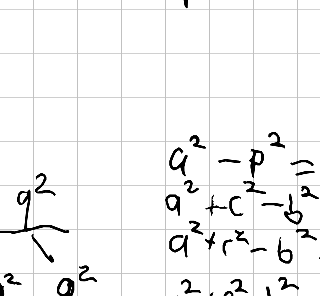
$q^2 + h^2 = b^2$

$h^2 = a^2 - p^2$

$h^2 = b^2 - q^2$

$a^2 - p^2 = b^2 - q^2$

$p = c - q$



$a^2 - (c-q)^2 = b^2 - q^2$

$a^2 - c^2 + 2cq - q^2 = b^2 - q^2$

$a^2 - c^2 - b^2 = -2cq + q^2 - q^2$

$a^2 - c^2 - b^2 = -2cq$

$\frac{a^2 - c^2 - b^2}{-2c} = q$

$a^2 - p^2 = b^2 - (c-p)^2$

$a^2 + c^2 - b^2 = p^2 + 2pc - p^2$

$a^2 + c^2 - b^2 = 2pc$

$\frac{a^2 + c^2 - b^2}{2c} = p$

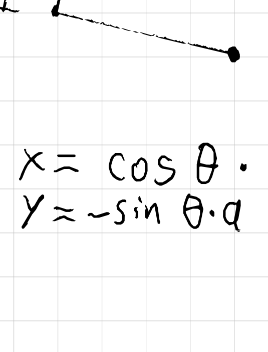
$\sin^{-1}\left(\frac{p}{a}\right) = \beta$

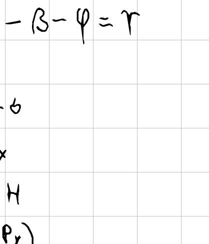
$\tan^{-1}\left(\frac{P_y}{P_x}\right) + \sin^{-1}\left(\frac{p}{a}\right) = \theta$

Yes!!

$q^2 + b^2 = h^2$

$\left(\frac{a^2 - c^2 - b^2}{-2c}\right)^2 + b^2 = h^2$





$\varphi + \beta + \gamma = 2\pi$

$2\pi - \beta - \varphi = \gamma$

$f(x) = \frac{P_y}{P_x} x$

$h(x) = -\frac{P_x}{P_y} x + b$

$b = h(x) + \frac{P_x}{P_y} x$

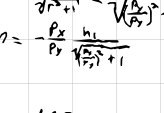
Fill in point H

$H = \frac{p}{c} \cdot (P_x, P_y)$

$b = P_y \frac{p}{c} + \frac{P_x^2}{P_y} \frac{p}{c}$

$x = \cos\theta \cdot a$

$y = -\sin\theta \cdot a$



$\frac{y}{x} = -\frac{P_x}{P_y} \Rightarrow y = -\frac{P_x}{P_y} x \Rightarrow r$

$y^2 + x^2 = h_1^2$

$r^2 x^2 + x^2 = h_1^2$

$(r^2+1) x^2 = h_1^2$

$x = \frac{h_1}{\sqrt{r^2+1}} = \frac{h_1}{\sqrt{\left(\frac{P_x}{P_y}\right)^2 + 1}}$

$y = -\frac{P_x}{P_y} \frac{h_1}{\sqrt{\left(\frac{P_x}{P_y}\right)^2 + 1}}$

$M_x = \frac{p}{c} P_x + h_x$

$M_y = \frac{p}{c} P_y + \frac{P_x}{P_y} h_x$

$p = \frac{a^2 + c^2 - b^2}{2c}$

$c = \sqrt{P_x^2 + P_y^2}$

$h_1 = \sqrt{a^2 - p^2}$

$h_x = \frac{\sqrt{a^2 - p^2}}{\sqrt{\left(\frac{P_x}{P_y}\right)^2 + 1}}$

yeah ok

something with matrices

Desmos

a & b are constants

P_a = actual pos on grid

$M(S, P_a) = M_r(P_a - S) + S$

$M_r(P) = ($

$\frac{p(P)}{d(P)} P_x + h_x(P)$

$\frac{p(P)}{d(P)} P_y + \frac{P_x}{P_y} h_x(P)$

$)$

$h_x(P) = \sqrt{\frac{a^2 - p^2(P)}{\left(\frac{P_x}{P_y}\right)^2 + 1}}$

$p(P) = \frac{a^2 - b^2 + d^2(P)}{2d(P)}$

$d(P) = \sqrt{P_x^2 + P_y^2}$

$M_r(P) = H(P) + \begin{pmatrix} 1 \\ \frac{P_x}{P_y} \end{pmatrix}$