$$V_a = \vec{x} + \vec{y} = V_a \cos\theta + V_a \sin\theta$$

$$V_y = \vec{x} + \vec{y} = -V_y \cos(90-\theta) + V_y \sin(90-\theta)$$

$$\vec{x} = x_2 - x_1 \approx \dot{x}$$

$$\vec{y} = y_2 - y_1 \approx \dot{y}$$

$$\vec{x} = V_a \cos\theta - V_y \cos(90-\theta)$$
$$\vec{y} = V_a \sin\theta + V_y \sin(90-\theta)$$

$x \sin\theta$
$x \sin(90-\theta)$

$x \cos\theta$
$x \cos(90-\theta)$

$\cos(90-\theta) = \sin\theta$

$\sin(90-\theta) = \cos\theta$

$\cos^2\theta + \sin^2\theta = 1$

$$\vec{x} \sin\theta = V_a \cos\theta \sin\theta - V_y \cos(90-\theta)\sin\theta$$
$$\vec{y} \cos\theta = V_a \sin\theta \cos\theta + V_y \sin(90-\theta)\cos\theta$$

$$\vec{x}\sin\theta - \vec{y}\cos\theta = -V_y \left(\cos(90-\theta)\sin\theta + \sin(90-\theta)\cos\theta\right)$$
$$\underbrace{\quad}_{\sin\theta} \qquad \underbrace{\quad}_{\cos\theta}$$

$$\vec{x}\sin(90-\theta) = V_a \cos\theta \sin(90-\theta) - V_y \cos(90-\theta)\sin(90-\theta)$$
$$\vec{y}\cos(90-\theta) = V_a \sin\theta \cos(90-\theta) + V_y \sin(90-\theta)\cos(90-\theta)$$

$$\vec{x}\sin(90-\theta) + \vec{y}\cos(90-\theta) = V_a\left(\cos\theta\sin(90-\theta) + \sin\theta\cos(90-\theta)\right)$$
$$\underbrace{\quad}_{\cos\theta} \qquad \underbrace{\quad}_{\sin\theta} \qquad\qquad \underbrace{\quad}_{\cos\theta} \qquad \underbrace{\quad}_{\sin\theta}$$

$$V_a = \vec{x}\cos\theta + \vec{y}\sin\theta$$
$$V_y = -\vec{x}\sin\theta + \vec{y}\cos\theta$$