AP Parametric Knowledge

To be "at rest" both $x'(t)$ and $y'(t)$ must $= 0$ at a time "t"

$$\frac{dy}{dt} = y'(t) \qquad \frac{dx}{dt} = x'(t)$$

tangent line is horizonal when $y'(t) = 0$ and $x'(t) \neq 0$

tangent line is vertical when $x'(t) = 0$ and $y'(t) \neq 0$

$$\frac{dy}{dx} = \frac{y'(t)}{x'(t)} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$$

indeterminate when $x'(t) = 0$ and $y'(t) = 0$

$x(t) =$ horizontal position

$y(t) =$ vertical position

$(x(t), y(t))$

$$\frac{d^2y}{dx^2} = \frac{\frac{d}{dt}\left(\frac{dy}{dx}\right)}{\frac{dx}{dt}}$$

to find your position parametrically at $t = b$

$$\left(x(a) + \int_{t=a}^{t=b} x'(t)dt,\ y(a) + \int_{t=a}^{t=b} y'(t)dt, \right)$$

Speed at time "t" $= \sqrt{[x'(t)]^2 + [y'(t)]^2}$

total distance traveled from $t = a$ to $t = b$ $\int_{t=a}^{t=b} \sqrt{[x'(t)]^2 + [y'(t)]^2}\,dt$

$tdt = arc\ length$

To change your calculator to parametric mode, press "mode" and change "Func" to "Par"

Now press "$Y =$". You can call up functions by pressing "Vars"$->$"$Y - Vars$"$->$"Parametric"

velocity vector $\langle x'(t), y'(t) \rangle$

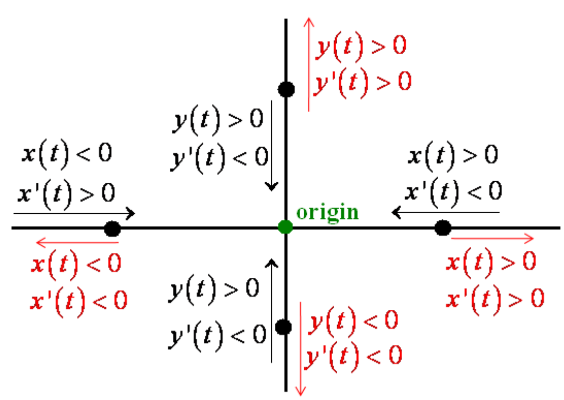
acceleration vector $\langle x''(t), y''(t) \rangle$

When traveling along the $x-axis$ or the $y-axis$:

Moving towards the origin:

$x(t)$ and $x'(t)$ have opposite signs

$y(t)$ and $y'(t)$ have opposite signs



Moving away from the origin:

$x(t)$ and $x'(t)$ have same sign

$y(t)$ and $y'(t)$ have same sign