March 15

SWBAT:

Use vectors to describe position, velocity and acceleration

Vector Notation

Component Form:

$\langle x(t), y(t) \rangle$

Equation:

$x(t)\vec{i} + y(t)\vec{j}$

Position	Velocity	Acceleration
$\langle x(t), y(t) \rangle$	$\langle x'(t), y'(t) \rangle$	$\langle x''(t), y''(t) \rangle$
$\langle \int x'\,dt, \int y'\,dt \rangle$	$\langle \int x''\,dt, \int y''\,dt \rangle$	

Speed	Direction
$\lvert v(t) \rvert$	$\dfrac{v(t)}{\lvert v(t) \rvert}$
magnitude of velocity	
$\sqrt{(x'(t))^2 + (y'(t))^2}$	

The position is given by $\langle \sin(2t), 2\cos t \rangle$

find the velocity + acceleration

$v(t) = \langle 2\cos(2t), -2\sin t \rangle$

$a(t) = \langle -4\sin(2t), -2\cos t \rangle$

$v(t) = \langle e^t - t, e^t + t \rangle$

find the position vector if at $t=0$ position is $\langle 1, 2 \rangle$

$x(t) = \int e^t - t\,dt$ $\qquad$ $y(t) = \int e^t + t\,dt$

$x(t) = e^t - \frac{t^2}{2} + C$ $\qquad$ $y(t) = e^t + \frac{t^2}{2} + C$

$1 = e^0 - \frac{0^2}{2} + C$ $\qquad$ $2 = e^0 + \frac{0^2}{2} + C$

$0 = C$ $\qquad$ $1 = C$

position $= \langle e^t - \frac{t^2}{2}, e^t + \frac{t^2}{2} + 1 \rangle$