Connections: position, velocity and acceleration

Known	New
$\frac{d}{dt}[x(t)] = v(t)$	$\int v(t)dt = x(t) + C$
$\frac{d^2x}{dt^2} = \frac{d}{dt}[v(t)] = a(t)$	$\int a(t)dt = v(t) + C$

2 − dimensional distance from origin at position (x, y): $d = \sqrt{x^2 + y^2}$

1−dimensional distance from origin at position x: $\sqrt{x^2} = |x|$

$\int_a^b v(t)dt$ is the displacement of the particle from $t = a$ to $t = b$.

Speed: $|v| = s$

Speeding up if signs of a & v agree.

Slowing down if signs of a & v disagree.

$\int_a^b s(t)dt = \int_a^b |v(t)|dt$ is the total distance traveled by the particle.

In this context, $s(t)$ is speed. $s(t)$ is also often used for position in space.