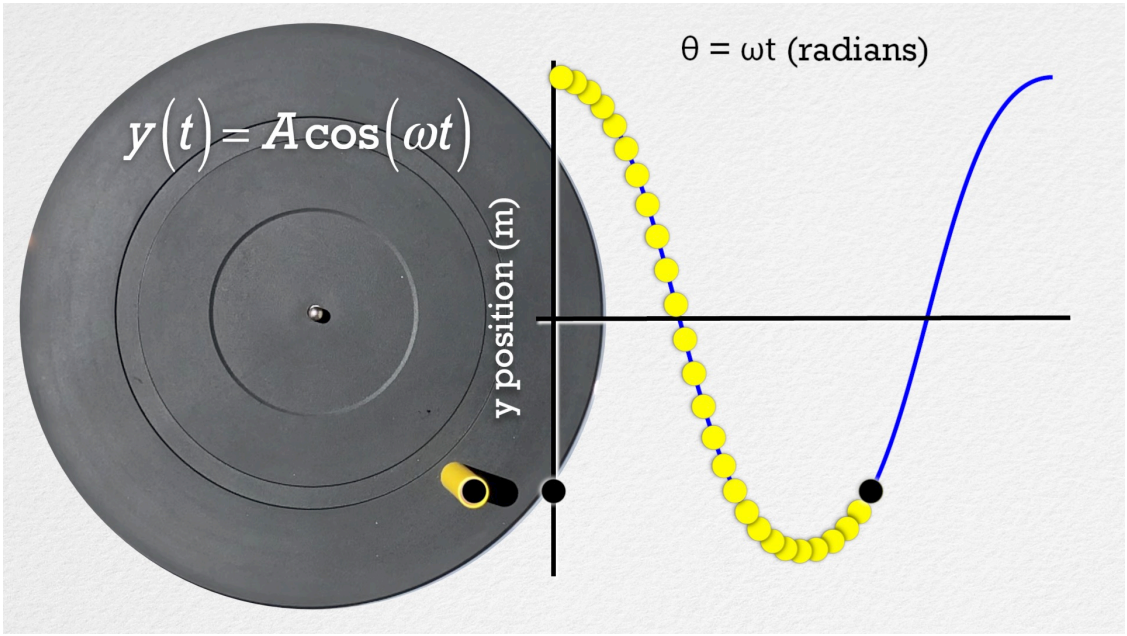
Flipping Physics Lecture Notes:

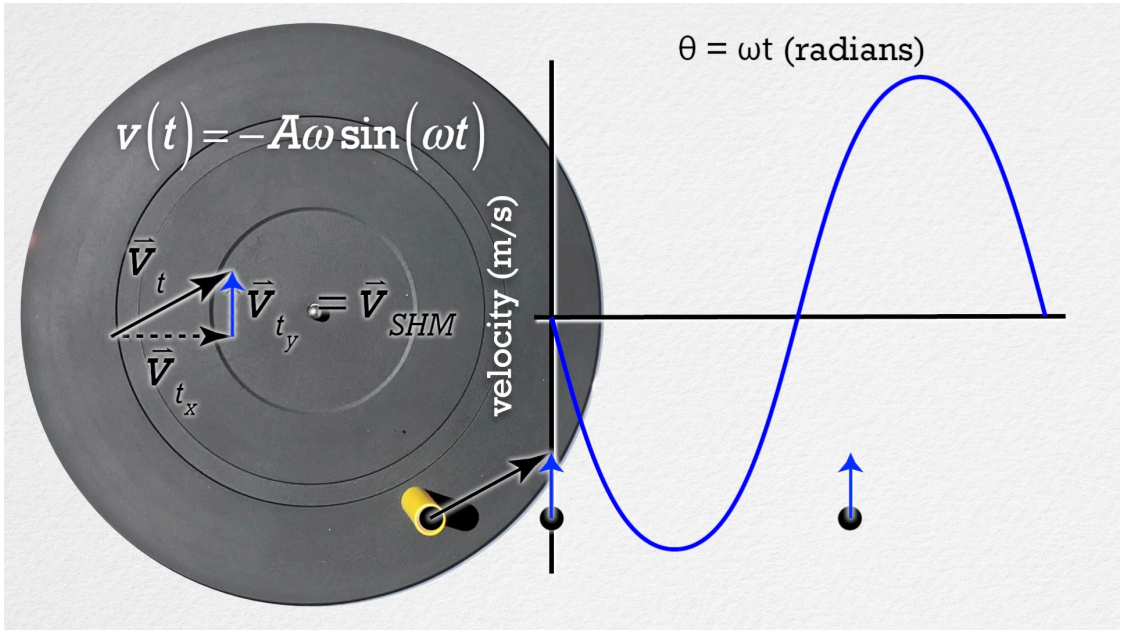
Simple Harmonic Motion – Graphs of Position, Velocity and Acceleration

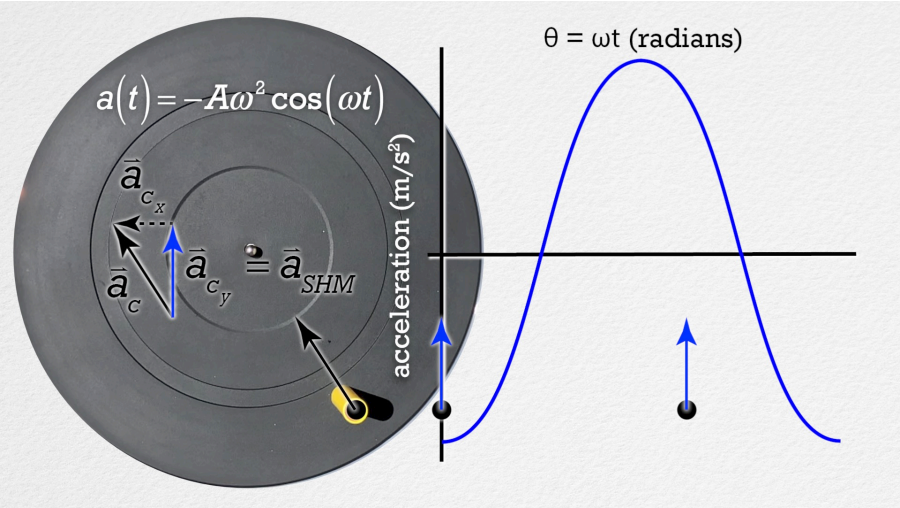
Previously we derived equations for position, velocity, and acceleration of an object in simple harmonic motion: $x(t) = A\cos(\omega t + \phi)$; $v(t) = -A\omega\sin(\omega t + \phi)$; $a(t) = -A\omega^2\cos(\omega t + \phi)$

Angular frequency, ω, derivation: $f = \frac{1}{T}$ & $\omega = \frac{\Delta\theta}{\Delta t} = \frac{2\pi}{T} = 2\pi f$

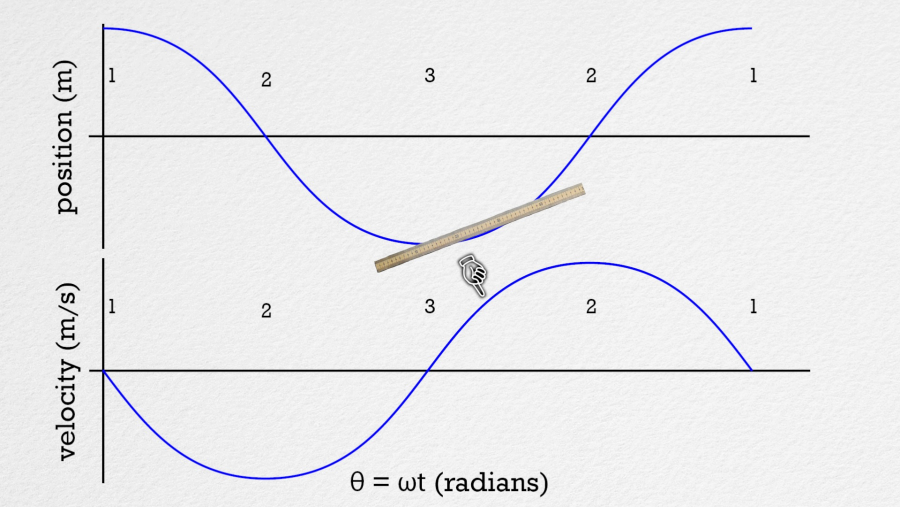
For our graphs, we are going to assume the phase constant, ϕ, is zero. In other words the graphs will not be phase shifted on the horizontal axis.







$$\vec{v} = \frac{d\vec{x}}{dt} \Rightarrow \text{velocity = slope of position vs. time}$$



$$\vec{a} = \frac{d\vec{v}}{dt} \Rightarrow \text{acceleration = slope of velocity vs. time}$$