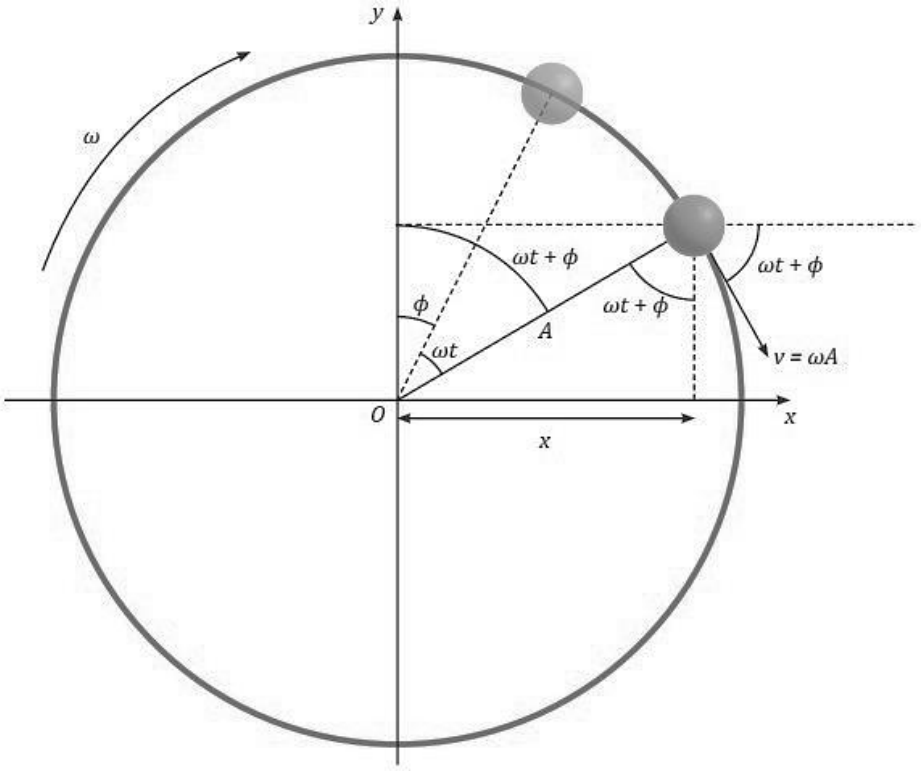
OSCILLATIONS

VELOCITY AND ACCELERATION IN SIMPLE HARMONIC MOTION

VELOCITY AND ACCELERATION IN SHM

Consider a UCM of a particle corresponding to the following SHM:

$x = A \sin(\omega t + \phi)$



The particle's speed in a circle with size A (amplitude) is A times ω. When we consider only the part of the speed that points in the horizontal direction (x-component,v_x), it can be calculated using geometry,

$v_x = A\omega \cos(\omega t + \emptyset)$

In the same way, we can find the part of the acceleration that affects the particle's horizontal movement (x-component).

$a_x = (\omega^2 A) \times (-\sin(\omega t + \emptyset))$

Where ω2A is the centripetal acceleration of the particle in the UCM.

$a_x = -A\omega^2 \sin(wt + \emptyset)$