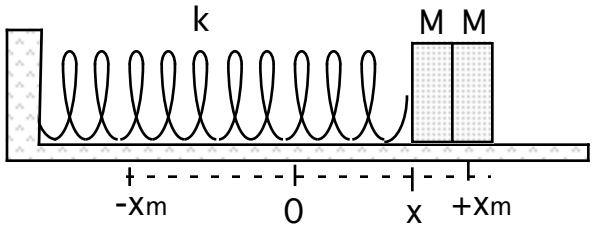
ATTACHMENT #1

An object of mass 2M, executes SHM on a frictionless table. One mass can be detached at any point, leaving the other attached to the spring.



General equations of SHM:

(1) $x = x_m \cos(\omega t + \phi)$ where ω = angular frequency, and ϕ = the angle between the initial position and the +x axis. (could be positive or negative).

(2) v(t) and (3) a(t) can be found by derivatives of (1).

Using (1), (2), and (3), eliminating t gives (4) v(x) and (5) a(x).

For a mass m, oscillating with period T, on a spring whose constant is k;

(6) $\omega = \frac{2\pi}{T}$ also $\omega = \sqrt{\frac{k}{m}}$

Force constant of a spring is in Hooke's law: (7) $F = -kx$

Potential energy in a spring with free end moved from unstressed spring at 0 to x: (8) $PE_{spring} = .5\, k\, x^2$