ALM

Local eg(1)

PHYSIC ΣF = const.

Motion of a particle under a set of constant forces (eg weight, tension etc..)

DYNAMIC

N II $\Sigma F = m(\text{accel})$

constant = m (accel)

constant = accel

CALCULUS

By calculus (or because we know)

accel = a

KINEMATIC

$v = u + at$

$v^2 = u^2 + 2ax$

$x = ut + \frac{1}{2}at^2$

where $x = 0$, $t = 0$

and $v = u$, $t = 0$

SHM

docal eg(2)

PHYSIC $\Sigma F = -$ const. x

Motion of a particle under forces which (are not const.) depend on displacement from a particular point. (eg springs, elastics etc.)

DYNAMIC

N II $\Sigma F = m(\text{accel})$

$-\text{constant} \cdot x = m(\text{accel})$

$-\text{constant}\, x = \text{accel}$

CALCULUS

By calculus (or 'cos we know)

$\text{accel} = -\omega^2 x$ ω = const.

KINEMATIC

$x = A\sin\omega t$

$v = A\omega\cos\omega t$

$v^2 = \omega^2(A^2 - x^2)$

where $x = 0$, $t = 0$

$x = A$, $v = 0$

EQUIVALENTS

$v = u + at$	$v = A\omega\cos\omega t$
$v^2 = u^2 + 2ax$	$v^2 = \omega^2(A^2 - x^2)$
$x = ut + \frac{1}{2}at^2$	$x = A\sin\omega t$

Periodic time $T = \frac{2\pi}{\omega}$ (has no equivalent)