

BASIC FORMULAS - FORCES & ENERGY

All symbols have their normal meanings.

Average velocity: $\bar{v}_x = \frac{\Delta x}{\Delta t}$.

Average acceleration: $\bar{a}_x = \frac{\Delta v_x}{\Delta t}$.

Circular motion: $v = \omega R$.

Centripetal acceleration: $a = \frac{v^2}{R}$.

Weight: $W = mg$.

Equation of motion: total force: $F = ma$.

Component of a vector a in a direction at angle θ : $a \cos \theta$.

Torque: $\tau = Fx$.

Density: $d = \frac{m}{V}$.

Pressure: $P = dhg$.

Work by a constant force: $W = F \cos \theta (x_1 - x_0)$.

Translational kinetic energy: $K = \frac{1}{2} mv^2$.

Gravitational PE: $U = mgh$.

For a rigid rotating body: $K = \frac{1}{2} I\omega^2$.

Spring force: $F = kx$.

Spring PE: $U = \frac{1}{2} kx^2$.

Any periodic phenomenon: $f = \frac{1}{T} = \frac{\omega}{2\pi}$.

SHM : $a = -\omega^2 x$.

SHM: $x = A \cos(\omega t + \phi)$.

SHM: $|v_{\max}| = A\omega$.

SHM: $|a_{\max}| = A\omega^2$.

SHM: $\omega = \sqrt{\frac{k}{m}}$.