KINEMATIC EQUATIONS FOR UNIFORMLY ACCELERATED MOTION

(i) $v = u + at$ or $v = v_0 + at$:

(ii) $S = ut + (1/2)\, at^2$ or $x - x_0 = v_0 t + (1/2)\, at^2$

(iii) $V^2 = u^2 + 2aS$ or $V^2 = v_0^2 + 2a(x - x_0)$

(iv) $S_{nth} = u + (1/2)\, a(2n-1)$

CALCULUS METHOD

(i) $v = u + at$ or $v = v_0 + at$:

By definition $a = \frac{dv}{dt} \quad Or \quad dv = a.dt$

Integrating both sides $\int_{V_0}^{V} dV = \int_{0}^{t} a.dt$

$$[V]_{V_0}^{V} = a\int_0^t dt \quad \text{OR} \quad V - V_0 = a[t]_0^t$$

$$V - V_0 = a(t - 0)$$

$$Or \qquad V = V_0 + a.t$$

(ii) $S = ut + (1/2)\, at^2$ or $x - x_0 = v_0 t + (1/2)\, at^2$

By definition $v = \frac{dx}{dt} \quad Or \quad dx = v.dt$

Integrating both sides $\int_{x_0}^{x} dx = \int_{0}^{t} v.dt \quad Or \quad \int_{x_0}^{x} dx = \int_{0}^{t} (v_0 + a.t).dt$