

Also we can write

$$acc = a(v)$$

$$\frac{dv}{dt} = a(v)$$

$$\int dt = \int \frac{dv}{a(v)}$$

$$t = \int \frac{dv}{a(v)} + D \rightarrow (2)$$

where D is constant of Integrations which can be determined from given value of velocity and at given time.

(3) Distance dependent acc.

In case of distance dependent acc.

$$acc = a(x)$$

$$v \frac{dv}{dx} = a(x)$$

$$\int v \frac{dv}{dx} = \int a(x)$$

$$\int v dv = \int a(x) dx$$

$$\frac{v^2}{2} = \int a(x) \cdot dx + E$$

where  $\frac{v^2}{2}$  E is constant of Integration

If  $\int a(x) dx = f(x)$   
we have  $\frac{v^2}{2} = f(x) + E$

$$v^2 = 2f(x) + E'$$

$$E' = 2E$$

$$v = \pm \sqrt{2f(x) + E'}$$

$$v = \frac{dx}{dt}$$