Kinematics

$$v = \frac{\Delta x}{\Delta t} \rightarrow \Delta x = v\Delta t \rightarrow x_f - x_i = vt \rightarrow \boxed{x_f = x_i + vt} \quad (1)$$

$$a = \frac{\Delta v}{\Delta t} \rightarrow \Delta v = a\Delta t \rightarrow v_f - v_i = at \rightarrow \boxed{v_f = v_i + at} \quad (2) \rightarrow t = \frac{v_f - v_i}{a}$$

$$x_f = x_i + vt$$

$$x_f = x_i + \bar{v}t$$

$$\boxed{x_f = x_i + \left(\frac{v_i + v_f}{2}\right)t} \quad (3)$$

$$x_f = x_i + \frac{1}{2}(v_i + v_f)t$$

$$x_f = x_i + \frac{1}{2}(v_i + v_i + at)t$$

$$\boxed{x_f = x_i + v_i t + \frac{at^2}{2}} \quad (4)$$

$$x_f - x_i = v_i t + \frac{at^2}{2}$$

$$\Delta x = v_i t + \frac{at^2}{2}$$

$$\Delta x = \frac{at^2}{2}, \quad v_i = 0$$

$$x_f = x_i + \left(\frac{v_i + v_f}{2}\right)t$$

$$x_f - x_i = \frac{1}{2}(v_i + v_f)t$$

$$2\Delta x = (v_i + v_f)t$$

$$2\Delta x = (v_i + v_f)\left(\frac{v_f - v_i}{a}\right)$$

$$2a\Delta x = (v_i + v_f)(v_f - v_i)$$

$$2a\Delta x = v_f^{\,2} - v_i^{\,2}$$

$$v_i^{\,2} + 2a\Delta x = v_f^{\,2}$$

$$\boxed{v_f^{\,2} = v_i^{\,2} + 2a\Delta x} \quad (5)$$

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