MY WORK

② $t_2 = \dfrac{V_2 - V_0}{a}$

⑤ $t_3 = \dfrac{d_3 - d_1}{V_1}$

④ $(t_3 - t_2) = \dfrac{V_2 - V_1}{a}$

③ & ① $d_3 = -\frac{1}{2} a (t_3 - t_2)^2 + V_2 (t_3 - t_2) + \frac{1}{2} a t_2^2 + V_0 t_2$

③ & ① & ② & ④ $d_3 = -\frac{1}{2} a \left[\overset{④}{\frac{V_2 - V_1}{a}}\right]^2 + V_2 \left[\overset{④}{\frac{V_2 - V_1}{a}}\right] + \frac{1}{2} a \left[\overset{②}{\frac{V_2 - V_0}{a}}\right]^2 + V_0 \left[\frac{V_2 - V_0}{a}\right]$

both sides by $2a^2$

$$2a^2 d_3 = -a(V_2 - V_1)^2 + 2aV_2(V_2 - V_1) + a(V_2 - V_0)^2 + 2aV_0(V_2 - V_0)$$

⑤ & expand

$$2a^2(\overset{⑤}{V_1 t_3} + d_1) = -a(V_2^2 - 2V_2V_1 + V_1^2) + 2aV_2(V_2 - V_1) + a(V_2^2 - 2V_2V_0 + V_0^2) + 2aV_0(V_2 - V_0)$$

$$2a^2 V_1 t_3 + 2a^2 d_1 = -\cancel{aV_2^2} + \cancel{2aV_2V_1} - aV_1^2 + 2aV_2^2 - \cancel{2aV_2V_1} + \cancel{aV_2^2} - \cancel{2aV_2V_0} + aV_0^2 + \cancel{2aV_2V_0} - 2aV_0^2$$

$$2a^2 V_1 t_3 + 2a^2 d_1 = -a V_1^2 + 2a V_2^2 + a V_0^2 - 2a V_0^2$$

$$2a^2 V_1 t_3 + 2a^2 d_1 = -a V_1^2 + 2a V_2^2 - a V_0^2$$

$$2a V_1 t_3 + 2a d_1 = -V_1^2 + 2 V_2^2 - V_0^2$$

$$2 V_2^2 = 2a V_1 t_3 + 2a d_1 + V_1^2 + V_0^2$$

$$V_2 = \sqrt{\frac{2a V_1 t_3 + 2a d_1 + V_1^2 + V_0^2}{2}}$$