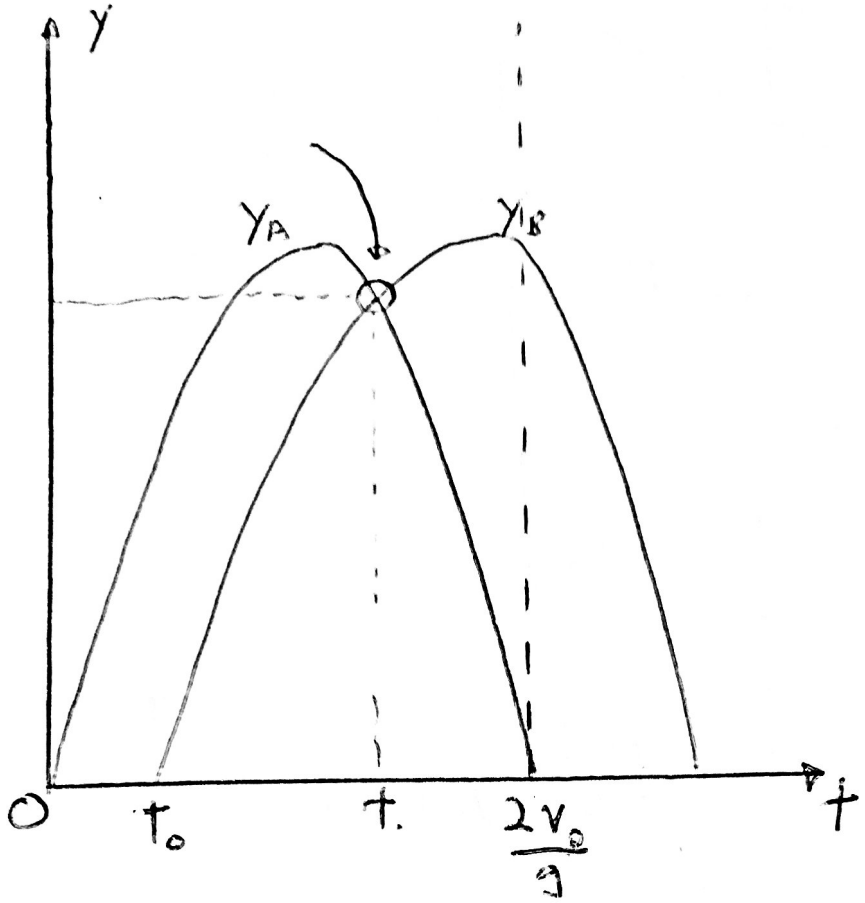

Height of ball is paraball function of the.

$$Y_A = \frac{V_0^2}{2g} - \left(t - \sqrt{\frac{V_0^2}{2g}}\right)^2$$

{ Kinematics: $v^2 = v_i^2 + 2ad$

$$Y_B = \frac{V_0^2}{2g} - \left(t - \sqrt{\frac{V_0^2}{2g}} - t_0\right)$$

Set $Y_A = Y_B$

$$\left(t - \sqrt{\frac{V_0^2}{2g}}\right)^2 = \left(t - \sqrt{\frac{V_0^2}{2g}} - t_0\right)^2$$

$\ominus$ { $\oplus$

$$-t + \sqrt{\frac{V_0^2}{2g}} = t - \sqrt{\frac{V_0^2}{2g}} - t_0$$

$$2t = t_0 + 2\sqrt{\frac{V_0^2}{2g}}$$

$$t = \frac{t_0}{2} + \sqrt{\frac{V_0^2}{2g}}$$