e_07_8_031

$$\vec{V}_0 = (V_0 \cos\theta, V_0 \sin\theta)$$

$$\vec{a} = (0, -g)$$

$$x(t) = V_0 \cos\theta \times t$$

$$y(t) = V_0 \sin\theta \cdot t - \frac{1}{2} g t^2$$

$$x(t_1) = d = V_0 \cos\theta \times t_1$$

$$y(t_1) = 0 = V_0 \sin\theta\, t_1 - \frac{1}{2} g t_1^2$$

$$t_1 = \frac{2V_0}{g} \sin\theta$$

$$d = V_0 \cos\theta\, t_1 = \frac{V_0^2}{g} \sin 2\theta$$

$$t_1 = \frac{2V_0^2}{g} \sin\theta$$

$$V^y(t) = V_0^2 - gt$$

$$V^y(t_1) = V_0 \sin\theta - g \times \frac{2V_0}{g} \sin\theta = -V_0 \sin\theta$$

$$V^x(t) = V_0^x = V_0 \cos\theta$$

$$\vec{V}(t_1) = (V_0 \cos\theta, -V_0 \sin\theta)$$

$$d = \frac{V_0^2}{g} \qquad \theta = 45^\circ$$