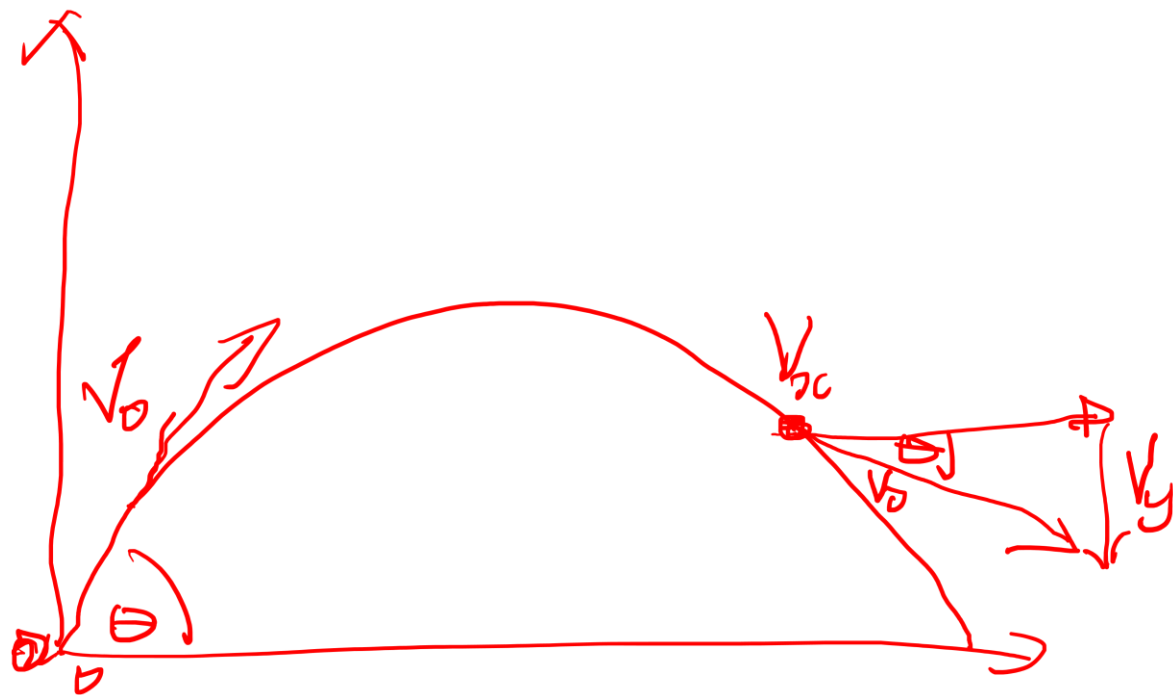




VELOCITY OF THE PROJECTILE AT ANY POINT

Horizontal displacement motion

$$x - x_0 = v_0 \cos \theta t$$

$$\frac{dx}{dt} = v_x = \frac{d}{dt} (v_0 \cos \theta t)$$

$$v_x = v_0 \cos \theta$$

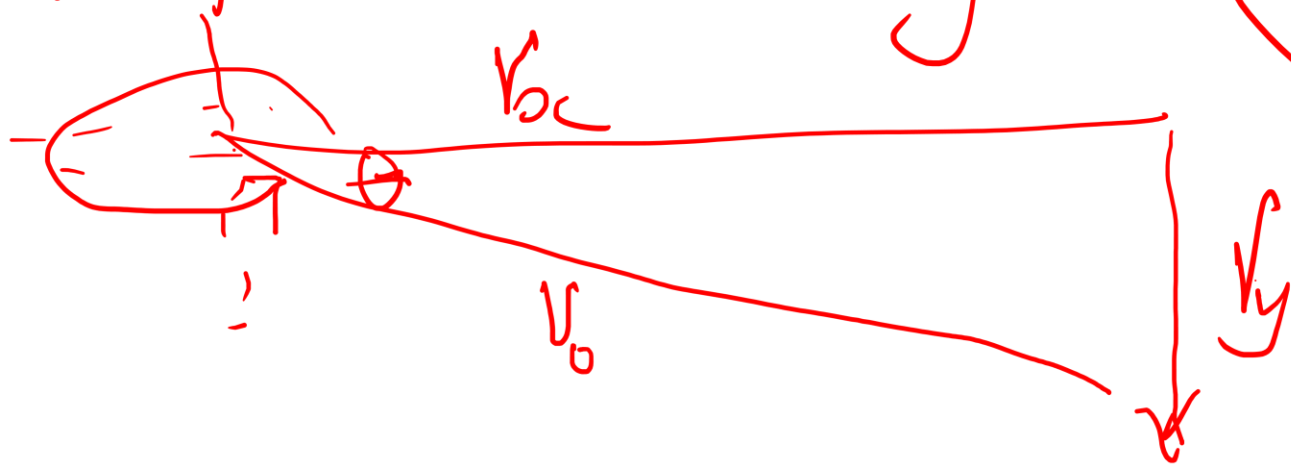
Vertical displacement motion

$$y_1 - y_0 = v_0 \sin \theta t - \frac{1}{2} g t^2$$

$$\frac{dy}{dt} = v_y = \frac{d}{dt} (v_0 \sin \theta t - \frac{1}{2} g t^2)$$

$$v_y = v_0 \sin \theta - g t \Rightarrow \text{calculate time}$$

e.g. v_a is positive and v_y is negative



$$V_o^2 = V_x^2 + V_y^2$$

$$\text{and } \theta = \tan^{-1} \frac{V_y}{V_x}$$