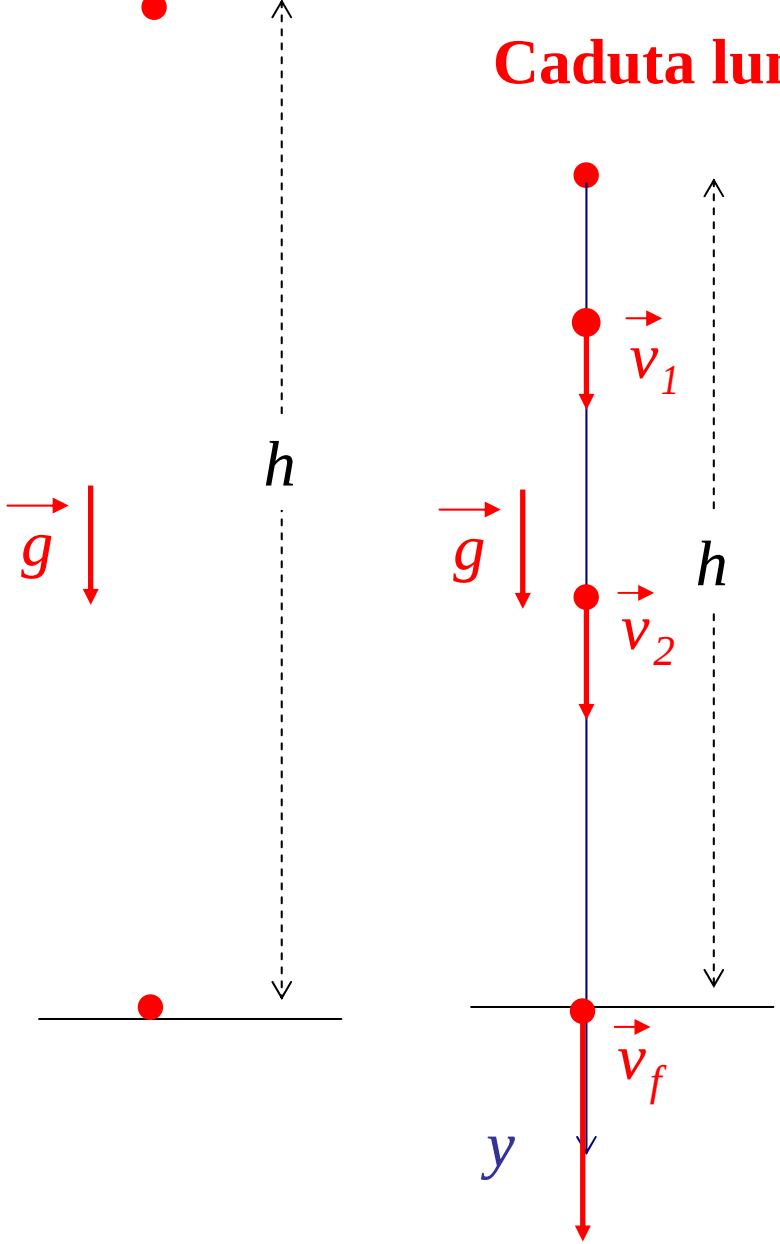
Caduta lungo la verticale



$$\begin{cases} v = v_0 + at \\ y = y_0 + v_0 t + \frac{1}{2} a t^2 \end{cases}$$

$$\begin{cases} v_0 = 0 \\ y_0 = 0 \end{cases} \qquad \begin{cases} v = gt \\ y = \frac{1}{2} g t^2 \end{cases}$$

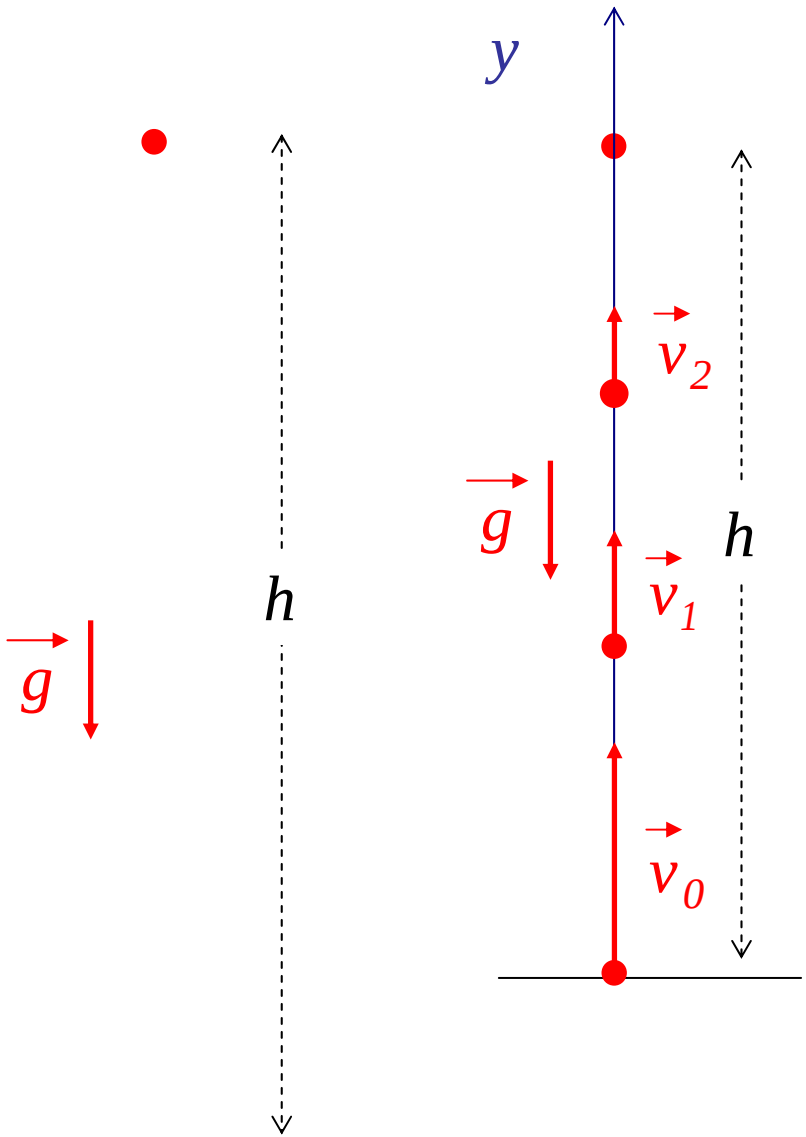
$$\begin{cases} v_f = g t_c \\ h = \frac{1}{2} g t_c^2 \end{cases}$$

$$t_c = \frac{v_f}{g} \qquad h = \frac{1}{2} g \frac{v_f^2}{g^2} = \frac{1}{2} \frac{v_f^2}{g}$$

$$v_f = \sqrt{2gh}$$

lancio verso l'alto

altezza massima?



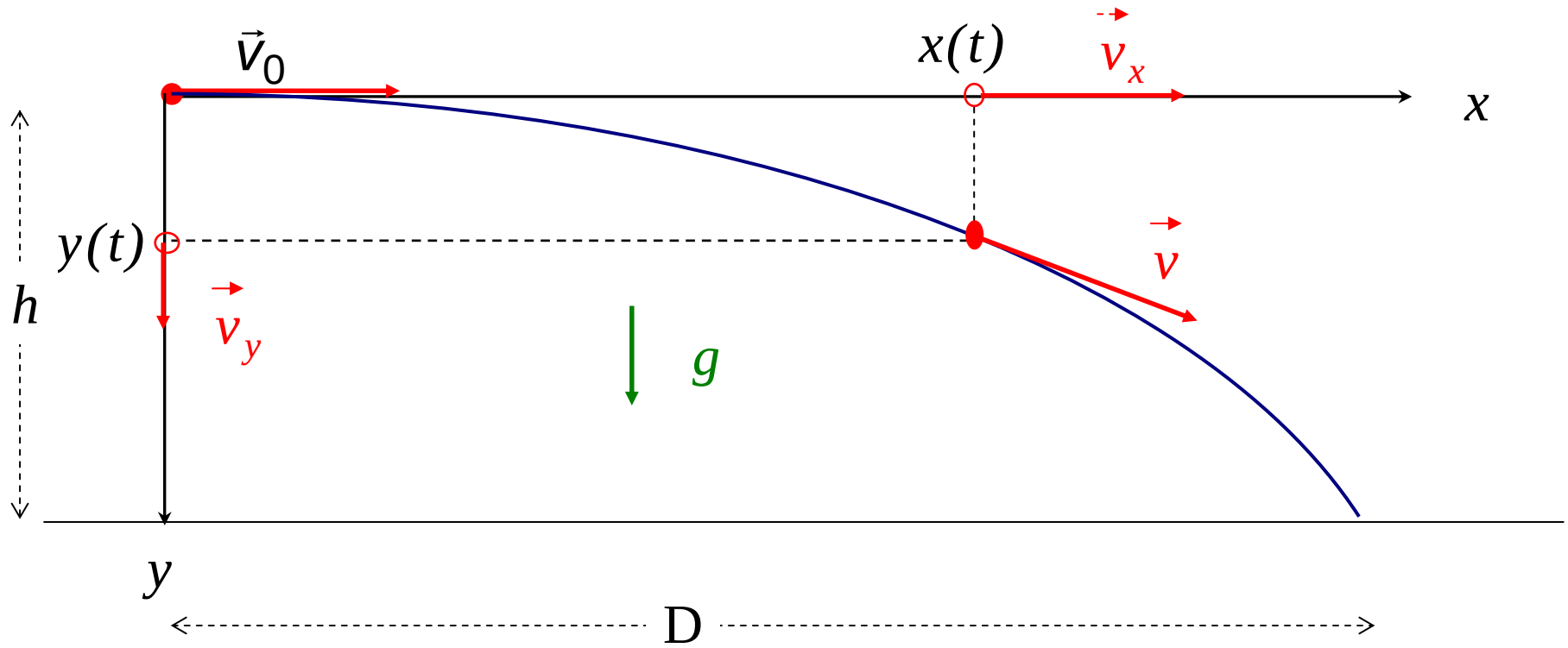
$$\begin{cases} y_0 = 0 \\ v_f = 0 \end{cases} \qquad \begin{cases} v = v_0 - gt \\ y = v_0 t - \frac{1}{2} g t^2 \end{cases}$$

$$\begin{cases} 0 = v_0 - g t_s \\ h = v_0 t_s - \frac{1}{2} g t_s^2 \end{cases}$$

$$t_s = \frac{v_0}{g}$$

$$h = \frac{v_0^2}{g} - \frac{1}{2} g \frac{v_0^2}{g^2} = \frac{1}{2} \frac{v_0^2}{g}$$

MOTO IN DUE DIMENSIONI - MOTO PARABOLICO



$$v_{0x} = v_0 \qquad a_x = 0$$

$$v_{0y} = 0 \qquad a_y = g$$

$$\begin{cases} v_x = v_{0x} = v_0 \\ v_y = gt \end{cases}$$

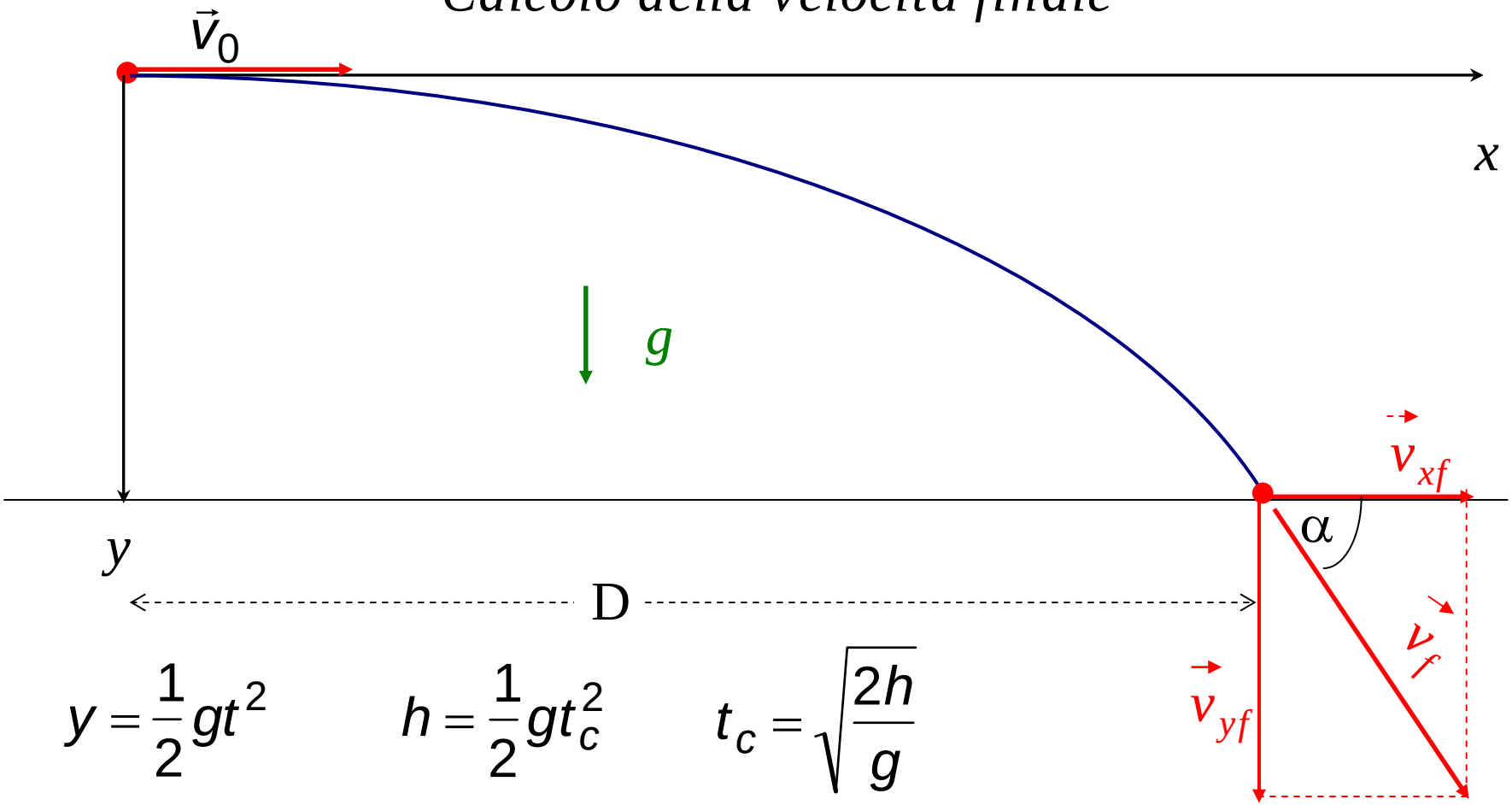
$$\begin{cases} x = v_0 t \\ y = \frac{1}{2} g t^2 \end{cases}$$

$$t = \frac{x}{v_0} \qquad y = \frac{1}{2} g \frac{x}{v_0^2}^2$$

La traiettoria è parabolica

Quando y = h: $\qquad D = v_0 \sqrt{\frac{2h}{g}}$

Calcolo della velocità finale



$$y = \frac{1}{2} g t^2 \qquad h = \frac{1}{2} g t_c^2 \qquad t_c = \sqrt{\frac{2h}{g}}$$

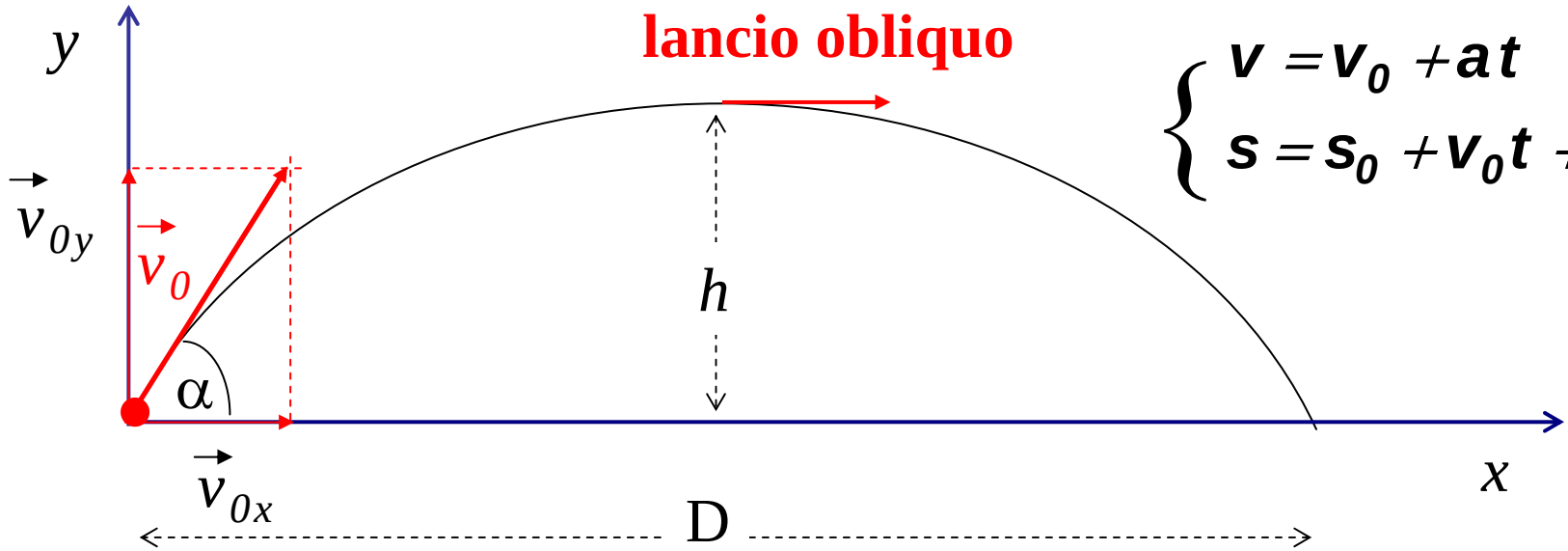
$$v_{xf} = v_0$$

$$v_{yf} = g t_c = g\sqrt{\frac{2h}{g}} = \sqrt{2gh}$$

$$v_f = \sqrt{v_o^2 + 2gh}$$

$$tg\alpha = \frac{v_{yf}}{v_{xf}} = \frac{\sqrt{2gh}}{v_0}$$

lancio obliquo



$$\begin{cases} v = v_0 + at \\ s = s_0 + v_0 t + \frac{1}{2} a t^2 \end{cases}$$

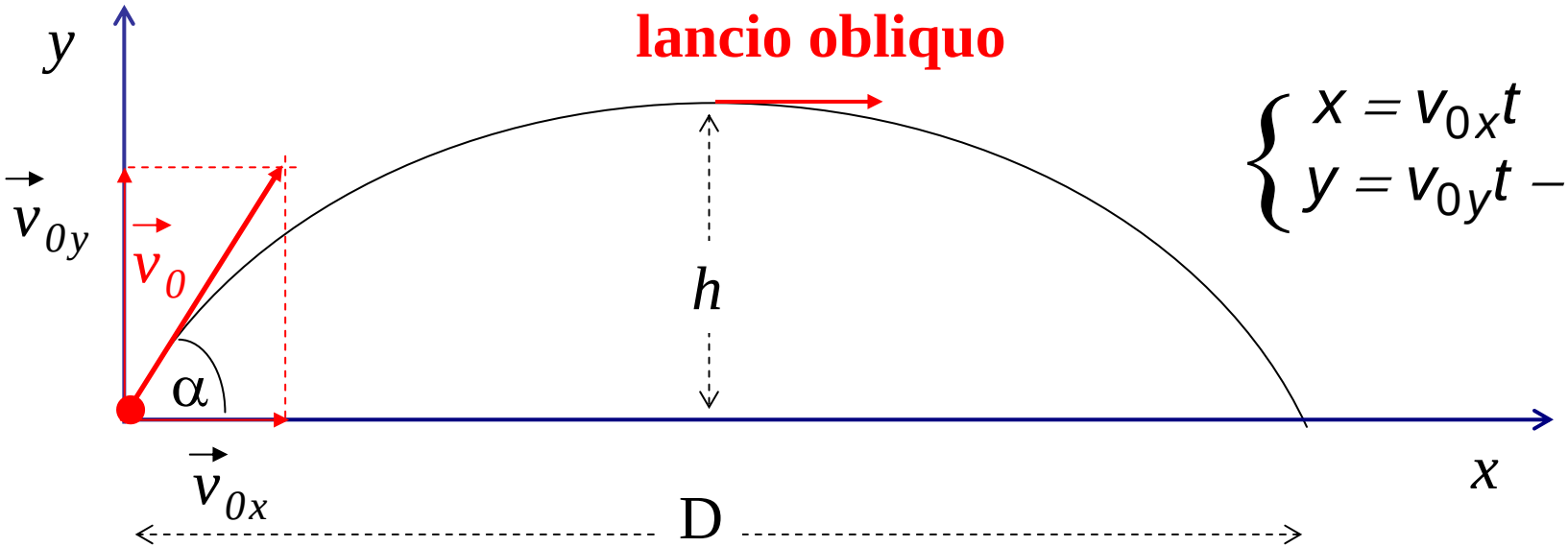
h?

$$\begin{cases} v_{0x} = v_0 \cos\alpha \\ v_{0y} = v_0 \operatorname{sen}\alpha \end{cases} \qquad \begin{cases} v_x = v_{0x} \\ v_y = v_{0y} - gt \end{cases} \qquad \begin{cases} x = v_{0x} t \\ y = v_{0y} t - \frac{1}{2} g t^2 \end{cases}$$

L'altezza massima è raggiunta quando $v_y = 0$ $\quad v_{0y} - g t_s = 0$

al tempo: $\quad t_s = \dfrac{v_{0y}}{g}$ $\qquad h = v_{0y} \dfrac{v_{oy}}{g} - \dfrac{1}{2} g \dfrac{v_{0y}^2}{g^2} = \dfrac{v_{0y}^2}{2g}$

lancio obliquo



$$\begin{cases} x = v_{0x}t \\ y = v_{0y}t - \frac{1}{2}gt^2 \end{cases}$$

D? v_f*?*

Calcoliamo il tempo di volo totale:

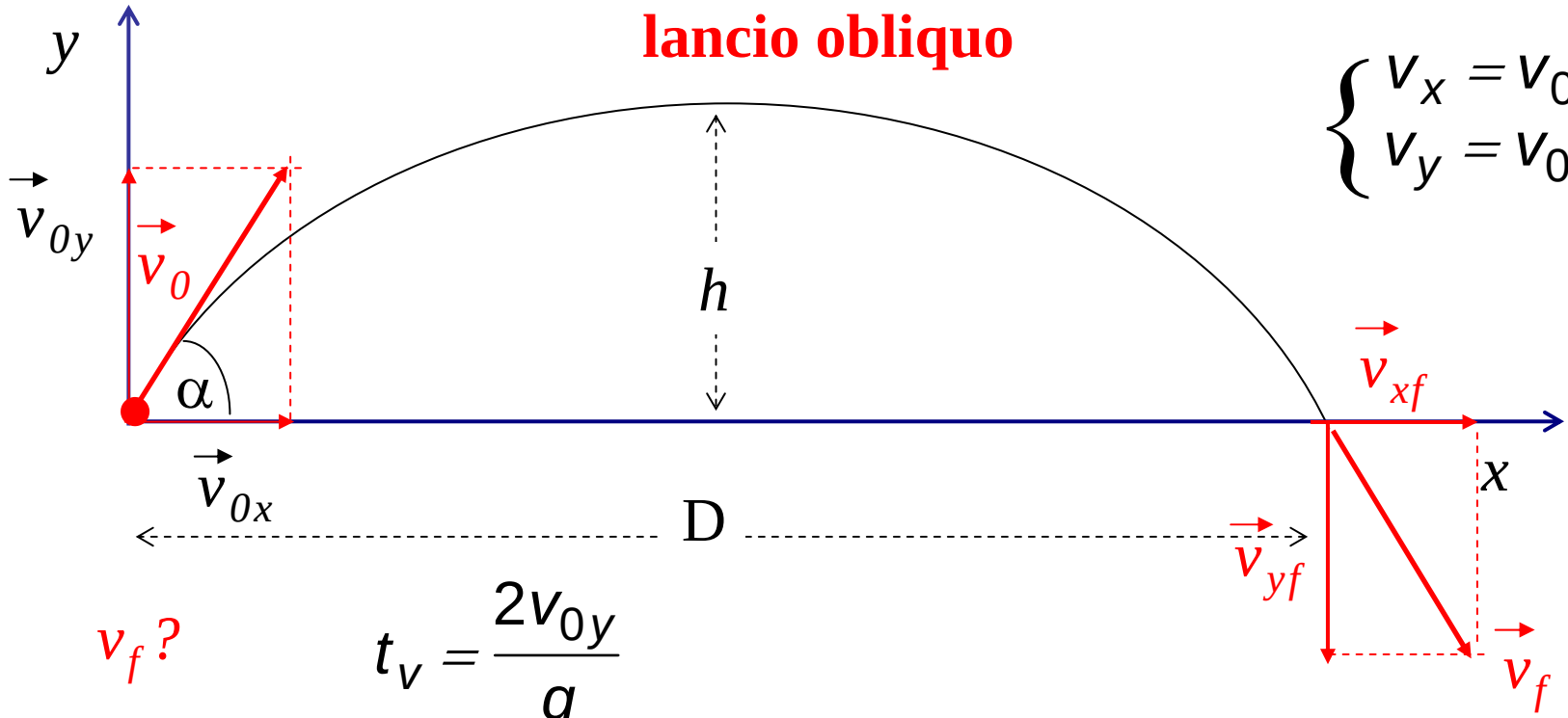
$$v_{0y}t - \frac{1}{2}gt^2 = 0 \qquad t\left(v_{0y} - \frac{1}{2}gt\right) = 0$$

L'equazione è soddisfatta per: $t = 0$ **e** $v_{0y} - \frac{1}{2}gt = 0$

$$t = t_v = \frac{2v_{0y}}{g}$$ **che è il doppio del tempo di salita.**

La gittata D è: $$D = v_{0x}t_v = \frac{2v_{0x}v_{0y}}{g}$$

lancio obliquo



$$\begin{cases} v_x = v_{0x} \\ v_y = v_{0y} - gt \end{cases}$$

v_f ?

$$t_v = \frac{2v_{0y}}{g}$$

$$v_{xf} = v_{0x}$$

$$v_{yf} = v_{0y} - g\frac{2v_{0y}}{g} = -v_{0y}$$

$$v_f = \sqrt{v_{ox}^2 + v_{0y}^2} = v_0$$