

Example

$$v_{0y} = 0, \quad v_{0x} = v_0$$

$$v_0^2 + v_y^2 = (3v_0)^2$$

$$\begin{aligned} v_y^2 &= v_0^2 - 2g\Delta y \\ &= -2 \times 9.8 \times (-20) = 392 \end{aligned}$$

$$v_y^2 = 8v_0^2 \quad \Rightarrow \quad v_0^2 = \frac{v_y^2}{8} = 49$$

$$\Rightarrow v_0 = 7$$

