Question

Motion in horizontal direction is described by the equation: $x = v_0 \cdot \cos 44° \cdot t$, where t is time of motion and v_0 is initial velocity. From this equation we can find time (t):

$$x = v_0 \cdot \cos 44° \cdot t \Rightarrow t = \frac{x}{v_0 \cdot \cos 44°}.$$

Motion in vertical direction is described by the equation: $y = v_0 \cdot \sin 44° \cdot t - \frac{g \cdot t^2}{2}$. We know time from previous equation, so we will have:

$$y = v_0 \cdot \sin 44° \cdot \frac{x}{v_0 \cdot \cos 44°} - \frac{g}{2} \cdot \left(\frac{x}{v_0 \cdot \cos 44°} \right)^2 =$$

$$= x \cdot \tan 44° - \frac{g \cdot x^2}{2 \cdot \cos^2 44°} \cdot \left(\frac{1}{v_0} \right)^2 \Rightarrow \frac{g \cdot x^2}{2 \cdot \cos^2 44°} \cdot \left(\frac{1}{v_0} \right)^2 = x \cdot \tan 44° - y \Rightarrow$$

$$\Rightarrow \left(\frac{1}{v_0} \right)^2 = \frac{2 \cdot \cos^2 44° \cdot \left(x \cdot \tan 44° - y \right)}{g \cdot x^2} \Rightarrow \frac{1}{v_0} = \sqrt{\frac{2 \cdot \cos^2 44° \cdot \left(x \cdot \tan 44° - y \right)}{g \cdot x^2}} \Rightarrow$$

$$\Rightarrow v_0 = \sqrt{\frac{g \cdot x^2}{2 \cdot \cos^2 44° \cdot \left(x \cdot \tan 44° - y \right)}}$$

We know that in our case $y = 3 \text{ meters}$ and $x = 11 \text{ meters}$, $g = 9.81 \ \frac{m}{s^2}$. So, we will have: $v_0 = \sqrt{\frac{9.81 \cdot 11^2}{2 \cdot \cos^2 44° \cdot \left(11 \cdot \tan 44° - 3 \right)}} = 12.27 \ \frac{m}{s}$.

Answer: $12.27 \ \frac{m}{s}$.