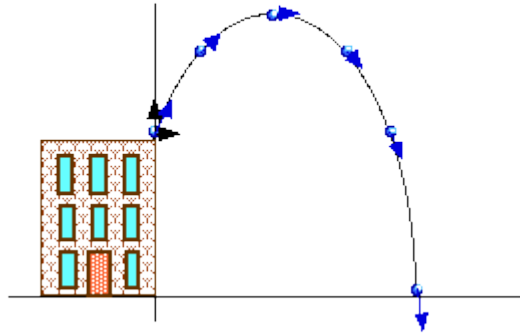


Answer on Question #54850 – Physics – Mechanics, Kinematics, Dynamics

Question: the soccer ball is kicked at 33° from the edge of the building with an initial velocity of 17 m/s and 61 m away from the wall. How tall is the building that the child is standing on?

Answer:

We have the following situation:



The ball travels along the parabola:

$$y = h + v_{oy}t - \frac{gt^2}{2}$$

Motion along the x direction is uniform, therefore the time of fall of the ball is

$$t_f = \frac{d}{v_{ox}} = \frac{61}{17 \cdot \cos 33^\circ} = 4.28 \text{ s}$$

At the time t_f the ball is at the point $y = 0$, therefore we can determine h from the first equation:

$$0 = h + v_{oy}t_f - \frac{gt_f^2}{2}$$

$$h = \frac{gt_f^2}{2} - v_{oy}t_f = \frac{9.8 \cdot (4.28)^2}{2} - 17 \cdot \sin 33^\circ \cdot 4.28 = 44.64 \text{ m}$$

Finally,

$$h = 44.64 \text{ m}$$