

Answer on Question #45288-Physics-Mechanics-Kinematics-Dynamics

A ball is projected from the ground with a speed of 25m/s two sec later it just clear a wall of 5m high. Find the angle of projection, max height. How far beyond the ball again till the ground?

Solution

Let the angle of projection be θ . Considering vertical motion at $t = 2$,

$$5 = 25 \sin \theta \cdot 2 - \frac{1}{2} \cdot 9.8 \cdot 2^2 \rightarrow \sin \theta = 0.492.$$

The angle of projection is

$$\theta = \sin^{-1} 0.492 = 29.5^\circ.$$

The maximal height of projection is

$$H = \frac{(v \sin \theta)^2}{2g} = \frac{(25 \cdot 0.492)^2}{2 \cdot 9.8} = 7.7 \text{ m.}$$

The range of projection is

$$R = \frac{v^2 \sin 2\theta}{g} = \frac{25^2 \sin 59}{9.8} = 54.7 \text{ m.}$$