

Physics 101Rec
Quiz#3
Chapter 4c

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Name: _____ Id: _____

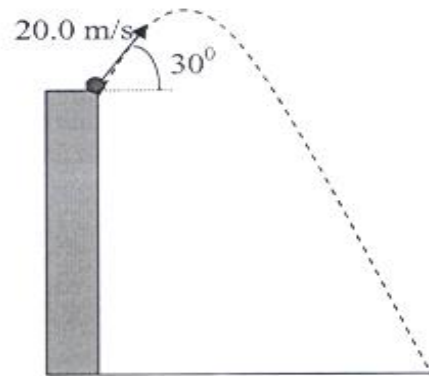
Sect: _____

A stone is thrown from the top of a building upward at an angle of 30.0° to the horizontal and with an initial speed of 20.0 m/s as shown in the figure. The ball hits the ground after 4.22 sec in flight.

(a) How high is the building?

$$\begin{aligned} y - y_0 &= v_{0y}t - \frac{1}{2}gt^2 \\ &= v_0 \sin \theta_0 t - \frac{1}{2}gt^2 \\ &= 20 \sin 30^\circ \times 4.22 - 4.9 \times (4.22)^2 \\ &= -45 \text{ m} \end{aligned}$$

The height of the building is 45 m



(b) What is the y-component of the velocity (v_y) of the stone just before it hits the ground?

$$\begin{aligned} v_y &= v_{0y} - gt = v_0 \sin \theta_0 - gt \\ &= 20 \sin 30^\circ - 9.8 \times 4.22 = -31.4 \text{ m/s} \end{aligned}$$