

58. To find the “launch” velocity of the rock, we apply Eq. 2-11 to the maximum height (where the speed is momentarily zero)

$$v = v_0 - gt \Rightarrow 0 = v_0 - (9.8 \text{ m/s}^2)(2.5 \text{ s})$$

so that $v_0 = 24.5 \text{ m/s}$ (with $+y$ up). Now we use Eq. 2-15 to find the height of the tower (taking $y_0 = 0$ at the ground level)

$$y - y_0 = v_0 t + \frac{1}{2} a t^2 \Rightarrow y - 0 = (24.5 \text{ m/s})(1.5 \text{ s}) - \frac{1}{2} (9.8 \text{ m/s}^2)(1.5 \text{ s})^2 .$$

Thus, we obtain $y = 26 \text{ m}$.