

82. (a) Using the same coordinate system assumed in Eq. 4-25, we rearrange that equation to solve for the initial speed:

$$v_0 = \frac{x}{\cos \theta_0} \sqrt{\frac{g}{2(x \tan \theta_0 - y)}}$$

which yields $v_0 = 255.5 \approx 2.6 \times 10^2$ m/s for $x = 9400$ m, $y = -3300$ m, and $\theta_0 = 35^\circ$.

- (b) From Eq. 4-21, we obtain the time of flight:

$$t = \frac{x}{v_0 \cos \theta_0} = \frac{9400}{255.5 \cos 35^\circ} = 45 \text{ s} .$$

- (c) We expect the air to provide resistance but no appreciable lift to the rock, so we would need a greater launching speed to reach the same target.