

## Chapter 3 Review - Two-Dimensional Motion

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The fastest recorded pitch in Major League Baseball, thrown by Nolan Ryan in 1974, was clocked at 162.3 km/h. If a pitch were thrown horizontally with this velocity, how far would the ball fall vertically by the time it reached home plate, 18.3 m away?

Equations for Projectile Launched Horizontally:

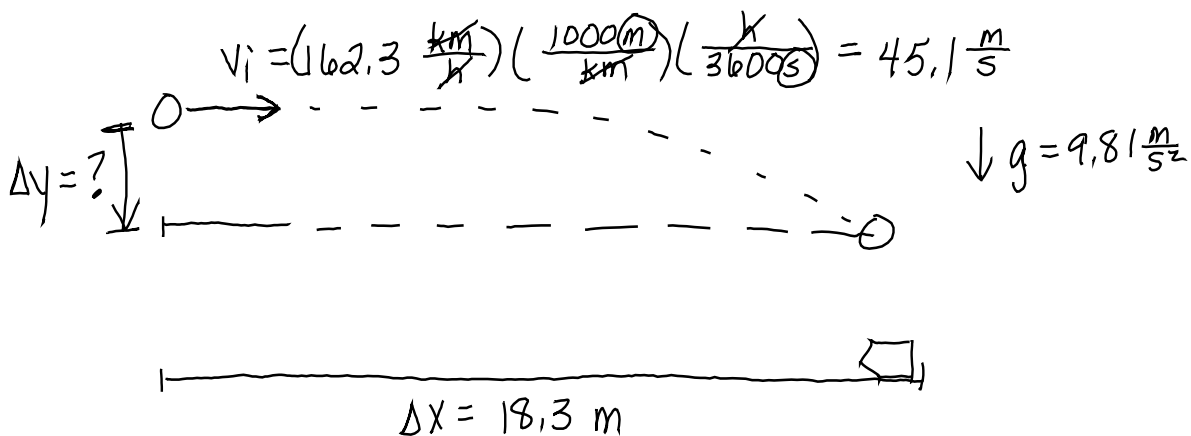
$$\boxed{\Delta y = -\frac{1}{2}g(\Delta t)^2}$$

$$v_{yf} = -g\Delta t$$

$$v_{yf}^2 = -2g\Delta y$$

$$\boxed{\Delta x = v_x \Delta t}$$

$$\boxed{v_x = v_{xi} = \text{Constant}}$$



$$\Delta y = -\frac{1}{2}g(\Delta t)^2$$

$$\Delta t = \frac{\Delta x}{v_x} = \frac{18.3 \text{ m}}{45.1 \frac{\text{m}}{\text{s}}} = 0.406 \text{ s}$$

$$\Delta y = -\frac{1}{2}(9.81 \frac{\text{m}}{\text{s}^2})(0.406 \text{ s})^2 = \boxed{-0.81 \text{ m} = \Delta y}$$