

AP Physics - Olympics In Drag

1. Consider a cannon ball ($m = 10.0 \text{ kg}$) launched with an initial velocity $100. \text{ m/s}$ @ 0.00° from the top of a cliff, one thousand meters above the ground. An aerodynamic drag force, linearly proportional to the ball's velocity, acts on the ball on its fall towards the ground. The drag coefficient, $b = 78.3 \text{ kg/s}$
 - A. Derive equations for the ball's horizontal and vertical velocity as functions of time.
 - B. Clearly sketch and label qualitative graphs of both velocity functions.
 - C. Derive equations for the ball's horizontal and vertical position as functions of time.
 - D. Clearly sketch and label qualitative graphs of both position functions.
 - E. Calculate the approximate horizontal displacement of the cannon ball during the fall.
 - F. **Derive a total velocity function and be promoted as a Disney Rock Star!**