

AP Physics – Aerodynamic Drag Forces

A small body of mass m located near the Earth's surface falls from rest in the Earth's gravitational field. Acting on the body is a resistive force of magnitude bv , where b is a constant and v is the speed of the body.

- Draw and identify all of the forces acting on the body as it falls.
- Write the differential equation that represents Newton's second law for this situation.
- Determine the terminal speed v_T of the body.
- Integrate the differential equation to obtain an expression for the speed v as a function of time t .
Use the condition that $v = 0$ when $t = 0$.
- Sketch and clearly label a graph of the speed v as a function of time t .
- Derive an expression for the position as a function of time. Use the condition that $y = 0$ when $t = 0$.
- Sketch and clearly label a graph of the position y as a function of time t .